Wanted urgently:

STEEL SCRAP

Shortage of steel scrap is threatening the war-production program.

If ships, planes, tanks and guns are to be produced in the volume needed to win the war, the country's steel-making facilities must operate at full capacity. But the plain truth is that the steel scrap to support continued capacity operations is not available, and not in sight.

United Effort Will Do the Job

Thanks to the construction of new blast furnaces, the deficiency is being partly made up by using more pig iron in steel-making. But tremendous quantities of additional scrap must be found within the crucial next few months.

Actually, many thousands of tons of steel scrap are potentially available *if only they can be gathered in*. This scrap, needed so urgently in the war effort, is scattered through the industrial plants, mines and railways, the farms and the homes of the nation. The problem is to collect it and get it moving to the steel mills. Everyone must help. If everyone will, there will be scrap to meet the needs of the war-production program.

Make a checkup in your plant or warehouse, or any other property you own or manage, and in your home.

Have any odds and ends of steel or iron that may be lying around collected. If you have any obsolete or idle equipment, machinery, or parts—anything that's made of iron or steel and isn't really needed—junk it, and get the scrap moving toward the steel mills.

How to Put Your Scrap to Work

Some iron or steel now lying rusting and forgotten around your property may help to save the lives of Americans in the battle areas. Gather up every possible bit of iron and steel scrap. Sell it to a local junk dealer, or get in touch with your local scrap salvage committee. Put your scrap to work for your country. It's needed, now!

BETHLEHEM STEEL COMPANY

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the postoffice at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

Look to BUDA

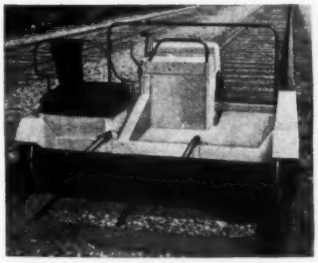
for all Railway Equipment and Supplies

the BUDA "Roadmaster"

SAFER — All controls within easy reach of one hand — Has adjustable 4 wheel brakes . . . safety skid rails.

ROOMIER — Ample room for 4 persons — ideal for Roadmasters and small gangs. Extra large deck space for tools and equipment . . . plenty of leg room.

MORE POWERFUL—Briggs & Stratton air cooled engine . . . new trouble-free clutch . . . positive chain drive.



THE BUDA "Buddy"

• Light inspection car — offers many advantages. Reliable, safe, economical to operate and is quickly and easily removed from truck.

Write for information about the complete BUDA line of railway equipment and supplies.

BUDA TRACK LINER

Easily operated. Aligns rails more accurately and faster. Has many superior features.

BUDA TRACK JACK

No. 514—all-around low type jack. Has rise of 5 in. plus 15 ton capacity.

BUDA TRACK JACK

No. 715—Buda Ratchet Type Jack with a 13" rise. Designed for long life, fast operation, safety and dependability.

BUDA TRACK DRILL

Drills rails faster, easier and safer. Four styles of rail hooks available.

BUDA NEW TIE NIPPER

Saves one man's time in pronging ties for tamping or spiking. Low cost. Easy to carry.

BUDA
ESTABLISHED
1881

Get a SAFER-BETTER Ride with BUDA

THE BUDA CO.

HARVEY (Chicago Suburb) ILLINOIS

Railroad Engineer tells Experience with POZZOLITH (CEMENT DISPERSION)

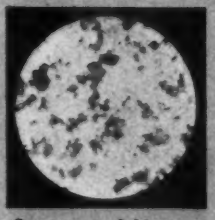
"PRODUCES INCREASED WORKABILITY, FASTER FINISHING... BETTER CONCRETE..."

The following letter tells of the Erie Railroad's seven years experience with Pozzolith on various types of construction:

"Reports show that Pozzolith produces increased workability and easier placeability, even though we have reduced mixing water as much as 15-20%. There has been a noticeable decrease in honeycombing and other segregation defects, enabling us to finish the concrete faster and at a lower cost.

Our regular inspections indicate that the concrete in which we have used Pozzolith has higher durability because to date we have no knowledge of maintenance expense on any of the concrete where this material was used."

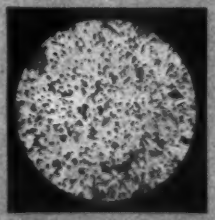
HOW CEMENT DISPERSION WORKS



Cement suspended in water UNDISPERSED

WITHOUT POZZOLITH

In a normal concrete mix, cement particles tend to bunch together, thereby (1) limiting hydration and (2) trapping water within the cement clumps. (See photomicrograph at left).



Cement suspended in water DISPERSED

WITH POZZOLITH

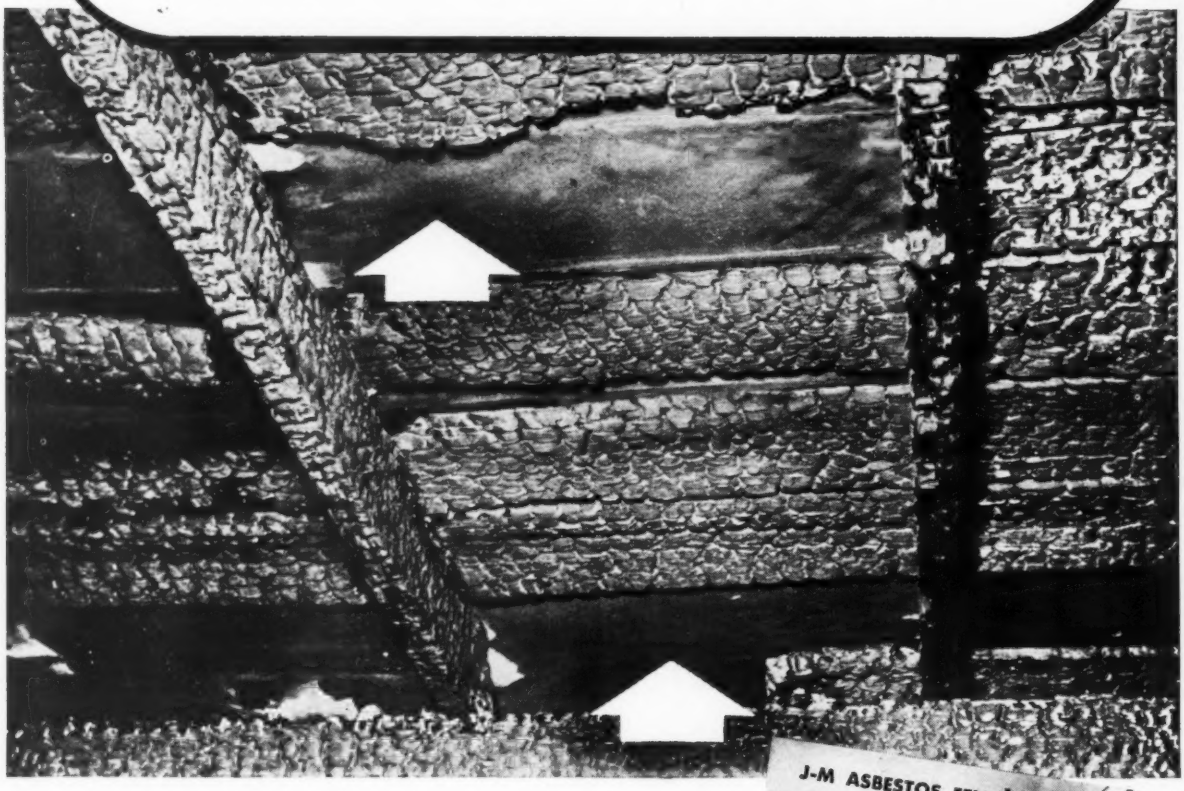
Cement Dispersion drives these particles apart and (1) exposes their entire surface area to hydration, at the same time (2) making the water entrapped in the clumps available for lubrication of the mix. (See photomicrograph at left).

Write for Pozzolith illustrated booklet which tells how Cement Dispersion produces greater speed, workability, placeability, watertightness, durability and reduces costs.

THE MASTER BUILDERS CO.
CLEVELAND, OHIO TORONTO, CANADA

MASTER BUILDERS

Here's how J-M Asbestos Felts protect against the spread of inside fires!



Unretouched photo above gives graphic proof of the way fires can be confined in buildings with Johns-Manville Asbestos Roofs . . *and this roof was 28 years old at the time of the fire.*

IN crowded yards where a large number of buildings are located, the roofs you use can make an important contribution to the safety of the entire area. A J-M ASBESTOS Roof will not only protect against flying sparks from outside fires—it will help to confine fires originating within buildings.

There is a J-M ASBESTOS Roof for every type of railroad building. For information regarding J-M Roofings or for the test sample described at right, address Johns-Manville at New York, Cleveland, Chicago, St. Louis, or San Francisco.

Make this Fire Test!

This test proves the fire-resistance of J-M ASBESTOS ROOFING FELTS. Note that the ordinary felt was reduced to ashes by the consuming flame, while the ASBESTOS FELT remained unharmed. We will gladly send you the materials so that you can make the test yourself.

JOHNS-MANVILLE

84 YEARS OF SERVICE TO TRANSPORTATION

Wherever There Are Ties To Come Out . . . . They'll Do the Job!

Best results are obtained when two of the Tie Cutters are used together. After the cuts have been made, the pieces are pried and lifted out.

WOOLERY TIE CUTTERS

Work Effectively in Stone, Gravel or Any Other Type of Ballast

Woolery Tie Cutters are speeding up tie-renewal programs for railroads in various parts of the country. Effective in Stone, Gravel or any other type of ballast, Woolery Tie Cutters eliminate the necessity for digging out the old tie by cutting it into three pieces which are easily lifted (not dug) out, leaving a practically undisturbed, compacted bed for the new tie.

The Woolery Tie Cutter is rugged—compact—rides easily on the side of a motor car to point of use—it is light in weight and can be easily removed from the track by its operator in 10 seconds.

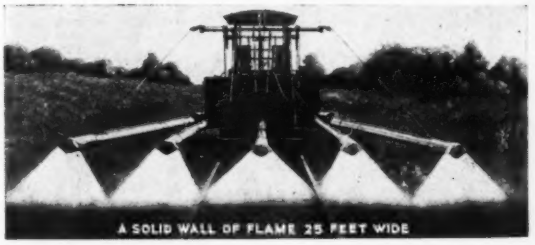
With the Woolery Tie Cutter trenching is eliminated. There is minimum disturbance to ballast and surfacing is reduced one-half.

WOOLERY WEED BURNERS

provide the most economical way to get rid of weeds.

There's a Woolery Weed Burner for every job; the Giant Octopus 5- and 3-burner models for main lines, the Midget Octopus 2-burner type for branch lines and around terminals, and the Junior portable unit for off-track work around buildings.

Write TODAY for complete information



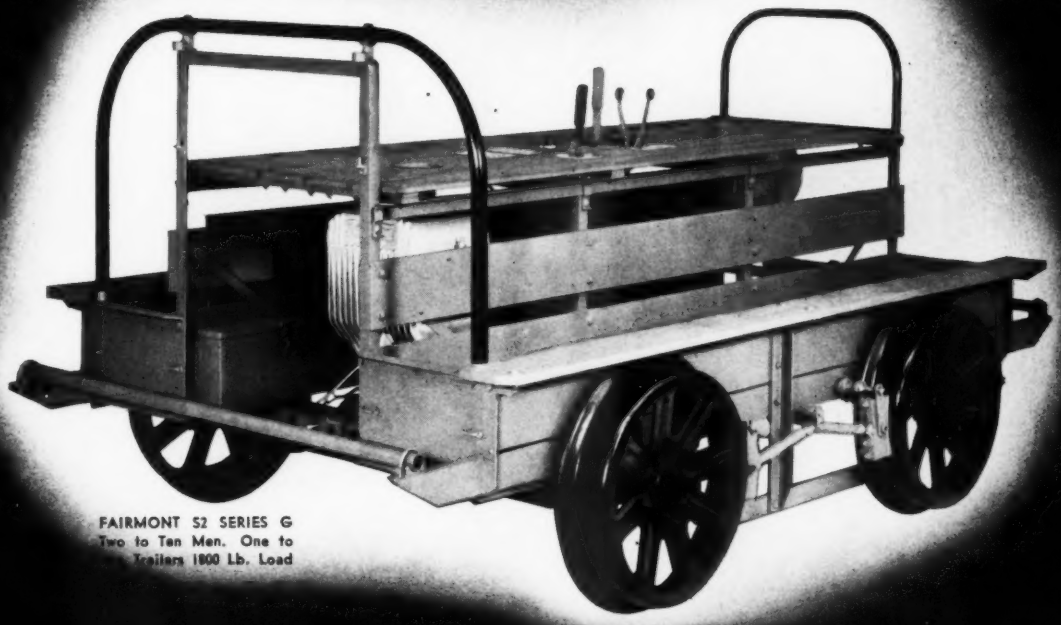
Giant Octopus Model with 5 burners—for main line track.

WOOLERY MACHINE COMPANY

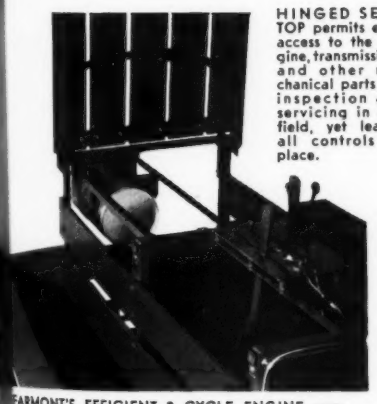
Minneapolis, Minnesota

Fairmont

HEAVY DUTY SECTION CARS

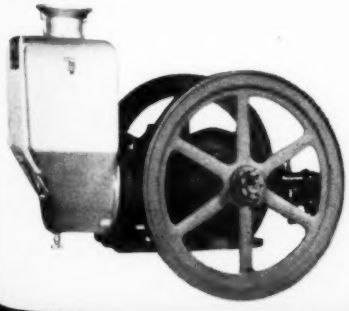


FAIRMONT S2 SERIES G
Two to Ten Men. One to
Trailers 1800 Lb. Load



HINGED SEAT TOP permits easy access to the engine, transmission, and other mechanical parts for inspection and servicing in the field, yet leaves all controls in place.

FAIRMONT'S EFFICIENT 2 CYCLE ENGINE generates abundant reserve power for heavy duty section service.



HAVE POWER AND STAMINA FOR YEARS OF ECONOMICAL SERVICE

For hauling gangs of 10 men with their tools and supplies, Fairmont heavy duty section cars offer many outstanding advantages. Their power plant is the time-proved, Fairmont, 8 to 13 horsepower engine. With its patented throttle valve, simple, efficient carburetor, 3-bearing crank-shaft, freeze-proof water cooling system, and many other advanced features, the Fairmont engine not only generates more power but also does the job with minimum fuel consumption. The transmission system is Fairmont's long-life endless cord belt, which not only gets the power to the wheels more efficiently but also absorbs the power impulses of the engine to assure a smoother ride. A ruggedly built frame, well braced against stresses in all directions, gives Fairmont heavy duty section cars greater endurance—so essential to low cost maintenance. For complete details ask for Bulletin 386. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

Performance ON THE JOB COUNTS

OF ALL THE CARS IN SERVICE TODAY ★ ★ *More Than Half are Fairmonts*

FOR THE FIRST TIME IN HISTORY the railroads—and their suppliers—have thrown the throttle of mass production wide open.

The railroads are transporting the greatest volume of traffic they have ever been called upon to handle. Their reserve can hardly accommodate a further large increase in the volume of traffic.

Our plants are running day and night to supply products to all of our customers in helping them meet the demands imposed upon them in their war effort. Priorities and other limitations, at times, prevent the maintaining of our long established reputation for making prompt deliveries. Some over-optimistic manufacturers may promise speedy deliveries but we all know that government regulations must be adhered to.

We are all devoting our plant and facilities to one objective — the winning of the war!

When placing an order for Ramapo Ajax products please insert the actual delivery deadline date and grant us as much time as you possibly can to complete the order.

RACOR **RAMAPO AJAX DIVISION**

THE AMERICAN BRAKE SHOE & FOUNDRY CO. · 230 Park Ave., New York

Oxy-Acetylene Rail-End Hardening

Postpones Batter and Joint Maintenance and Prolongs the Life of Rails and Equipment

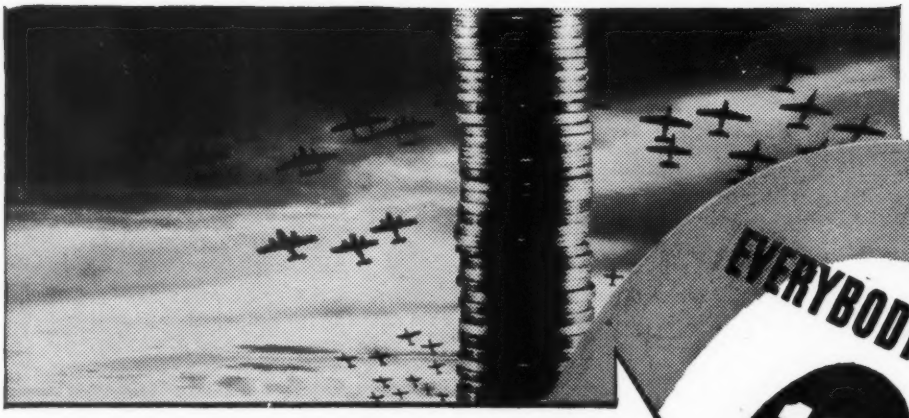
● Rail ends hardened by the Oxweld method resist batter so effectively that joint maintenance is substantially reduced and rail life is greatly prolonged. This work is performed in track shortly after the rail has been laid, without interrupting traffic and without tying up railroad equipment.

Joint bars and bolts, have a longer useful life when excessive batter is not permitted to develop at the rail ends and wear and tear on rolling equipment is reduced.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation

UCC

Carbide and Carbon Building Chicago and New York



New Target for Industry:

More Dollars Per Man Per Month in the PAY-ROLL WAR SAVINGS PLAN

TO WIN THIS WAR, more and more billions are needed and needed fast—**AT LEAST A BILLION DOLLARS A MONTH IN WAR BOND SALES ALONE!**

This means a *minimum* of 10 percent of the gross pay roll invested in War Bonds in every plant, office, firm, and factory in the land.

Best and quickest way to raise this money—and at the same time to "brake" inflation—is by stepping up the Pay-Roll War Savings Plan, having every company offer every worker the chance to buy MORE BONDS.

Truly, in this War of Survival, VICTORY BEGINS AT THE PAY WINDOW.

If your firm has already installed the Pay-Roll War Savings Plan, *now is the time—*

1. To secure wider employee participation.
2. *To encourage employees to increase the amount of their allotments for Bonds, to an average of at least 10 percent of earnings—because "token" payments will not win this war any more than "token" resistance will keep the enemy from our shores, our homes.*

If your firm has not already installed the Pay-Roll War Savings Plan, *now is the time to do so.* For full details, plus samples of result-getting literature and promotional helps, write, wire, or phone: War Savings Staff, Section E, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

U. S. War Savings Bonds

This space is a contribution to America's all-out war program by

RAILWAY ENGINEERING AND MAINTENANCE

SAVE TO WIN

PROTECT

Steel from Corrosion with RMC PLASTIC

Now—when both labor and steel are scarce . . . and becoming still more scarce . . . RMC PLASTIC is prolonging the service life of thousands of tons of rail and is doing the job quickly and effectively with one simple application.

★ RMC PLASTIC Saves Steel by protecting the most vulnerable spots, the joints, from all corrosive agencies.

★ RMC PLASTIC Protects for life of the rail.

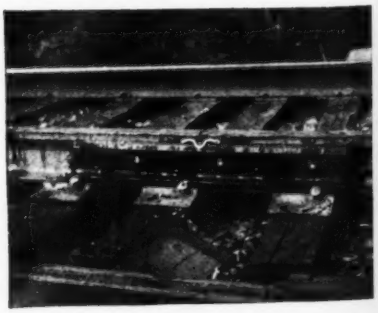
★ RMC PLASTIC saves Labor by preventing joint freezing, reaching, protecing and thoroughly lubricating every joint fastening and surface. This assures proper expansion and contracting of joints reducing rail-end batter.

★ RMC PLASTIC Speeds up Joint Maintenance. Threads of bolts and nuts protected by RMC PLASTIC do not deteriorate . . . bolts can be drawn up to tighten assembly when necessary.

★ RMC PLASTIC enables faster joint renewals. Dismantling of the joint assembly is easy when threads are preserved by RMC PLASTIC. Nuts turn readily, flame-cutting is not needed.

Moulded blocks of R.M.C. Plastic, 12-in. long, are laid on inner faces of joint bars before assembly—four for 4-hole joint, six for 6-hole.

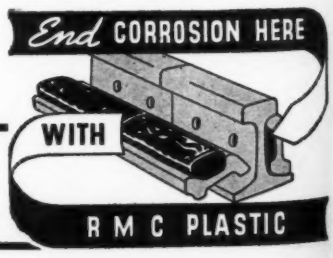
Joint bars are applied in regular manner. Bolt threads are thoroughly coated with lubricant as the bolts are pushed through and taken up.



As the bolts are tightened, the pressure forces the plastic preservative compound into all voids in the joint area, packs them solidly.

NO HIGH PRIORITIES ON RMC PLASTIC

You Can Get All You Want When You Want It!



RAILWAY MAINTENANCE CORP.
PITTSBURGH, PENNSYLVANIA

NEVER USE OVERSIZE TIPS

Of course you know that the larger the tip, the more oxygen and acetylene it uses. But did you ever stop to realize how wasteful an oversize tip can be. For example, a No. 2 tip instead of a No. 1 for cutting ½-inch steel plate wastes 10 to 20% in oxygen, approximately 16% in acetylene — wastes gas badly needed to build ships, tanks, guns and planes.

Be sure you and your men use every cubic foot of oxygen and acetylene to best advantage. Let's every one of us be our own Waste Warden—fight waste to speed victory.

THE WASTE WARDEN *says:*

DO close cylinder valve after use.
DO check your hose and connections for leaks.
DO keep your cylinder inventory low and return empties promptly.
DO keep tips clean and free from carbon and slag.

★ ★ ★

DON'T use excessive pressure.
DON'T use oversize tip.
DON'T leave torch burning when not in use.
DON'T abuse cylinders.

Air Reduction

General Offices:
60 EAST 42nd STREET, NEW YORK, N. Y.
IN TEXAS
MAGNOLIA-AIRCO GAS PRODUCTS CO.

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

No. 165 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: For Men in Service

September 1, 1942

Dear Reader:

In a war of the magnitude of that in which we are now engaged, it is to be expected that many railway and railway supply men will be drawn into military service, either individually or as members of specialized railway units. And while in this service, it is not unnatural that they should desire to keep abreast of developments in the railway field from which they came. This is true especially if they are members of railway battalions, carrying on much the same activities as in peace time.

Two incidents in recent weeks have brought this fact home to me. One occurred during the "opening" of the military railroad serving Camps Claiborne and Polk, the construction of which was described in the August issue. At this "opening", at which Neal Howard, managing editor, was present, officers from two different railway battalions asked him whether arrangements could be made for a number of their men to subscribe to Railway Engineering and Maintenance in order that they might continue to receive "their paper" while in military service.

The second evidence of such interest was included in a letter received a few days ago from a long-time subscriber overseas who wrote, incidental to other matters, that "two friends of yours, Col._____ and Maj._____ are sitting in my office while I am dictating this letter, looking through the latest issues of Railway Engineering and Maintenance."

These definite evidences of interest have caused us to offer to send our magazine to any railway or railway supply man who is in service either at home or abroad and who desires it, at a cost of $1 a year, half the regular subscription rate. This rate, which is the only reduced rate in effect, is obviously unremunerative to us (our production costs alone greatly exceed this figure) but is made to railway and railway supply men in service in recognition of the sacrifice they are making in behalf of all of us. I will be glad to handle with our circulation department any subscriptions received under this offer.

Yours sincerely,

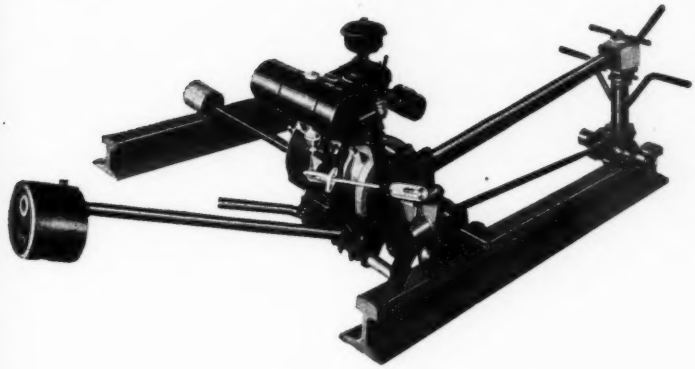
Elmer T. Howson

ETH:WB

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

Raco Power Track Machine



On 60 railroads they have established **remarkable records** for economy.

Ease of operation, lightweight, automobile type construction insure **maximum speed and minimum service interruptions.**

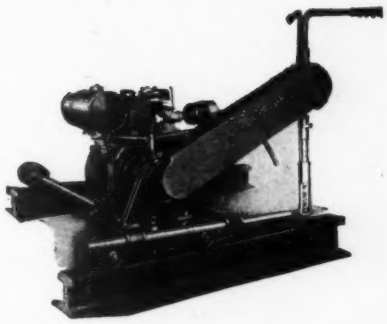
Tightening-out-of-face with the Raco lasts several times as long as hand tightening and insures **uniform tension on all bolts.**

Raco Tie Boring Machine

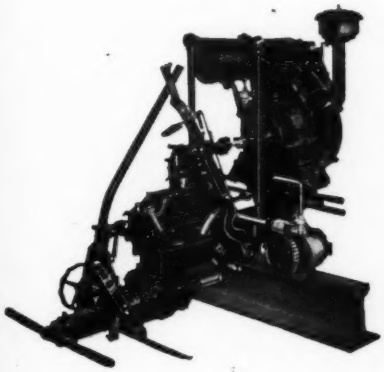
For Screw Spiking use Raco Tie Borer in conjunction with Raco Power Track Machine equipped with Screw Spike Chuck Unit. This combination of light, mobile units affords the most rapid, accurate and economical means of boring for and setting Screw Spikes to a uniform holding tension.

Boring holes for Cut Spikes has the following decided advantages:

Greater holding power.
Wood fibre undisturbed.
Tie splitting eliminated, therefore retarding decay.
Spikes always centered and vertical.
No thrust against plates to ultimately cause spreading or pinching of track gauge.
Fast and easy driving.
Application of creosote to spike holes and minimizing tie plate wear.



Everett Power M-W Machine



For fourteen years the Everett M-W has been the **standard** power rail drill on practically all railroads.

Its design and construction insure the utmost in facility of operation and in speed and accuracy of adjustment.

It has made such astonishing records for economy that **no road can afford to use any other means for drilling bolt holes.**

RAILROAD ACCESSORIES CORPORATION

MAIN OFFICE
137 EAST 42nd STREET, NEW YORK
(Chrysler Bldg.)
FACTORIES: LONG ISLAND CITY, N. Y., ALBANY, N. Y.

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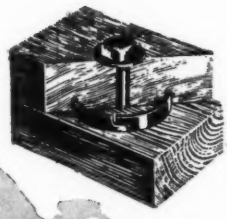
PRINTED IN U.S.A.

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

SEPTEMBER, 1942

Making all TIMBER connections



The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

Types of Railway structures using TECO TIMBER CONNECTORS:

1. Roof Trusses
2. Overhead Cranes
3. Timber Bents
4. Connections between pile heads and caps.
5. Trestles.
6. Ballast deck stub piles.
7. Piers.
8. Pier Fenders
9. Sway Bracing
10. Coal Pockets
11. Auto Loading Dock
12. Between Rail Post and Tie Connections
13. Bridge Decks
14. Scaffolding
15. Coaling Towers
16. Warehouses

This structure employs TECO spike grids in all braced joints . . . The TECO system of construction is ideally suited to shop fabrication. All bents for this trestle were pre-framed and pre-treated.

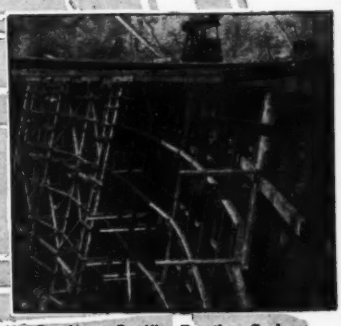
Detroit Terminal loading dock, 600' x 50'. Thirty-five 50' trusses fabricated and assembled at job site and erected in units.

Because of advantages in strength, economy, and long life, the railways of America use timber and TECO Connectors for practically every type of railway structure.

These advantages . . . of more joint strength with less wood and hardware . . . are obvious to those familiar with the TECO System of Timber Construction, which has been largely responsible for the many advances recently made in engineering timber to modern use as a construction material.

Full details, with case histories of jobs done, will be sent you on request.

Chesapeake & Ohio Roundhouse, Clifton Forge, Virginia. Split rings were used for timber roof truss joint connections. Toothed rings were used for attachment of timber roof truss seats to timber columns.



Southern Pacific Trestle, Cochran, Ore. TECO toothed rings (3⅛") used in bracing connections on this structure.

Timber ENGINEERING COMPANY

WASHINGTON D. C. PORTLAND, ORE.

Railway Engineering and Maintenance

Safety—

A War-Time Necessity

Seven hundred and forty-nine railway employees were killed and more than 25,000 were injured while on duty in 1941. This was an increase of 40 per cent in the number killed and of 41 per cent in the number injured, over 1940. And the same upward trend is shown in the records for the first three months of 1942.

Such a record challenges attention at any time, for it involves a preventable loss of human life. It *demands* correction today, for, in addition, it threatens the success of the railways' war effort. And since maintenance of way employees comprise the second largest group of employees on the railroads, and one in which the accident rate is normally high, the challenge may be directed particularly to this group.

Railways Handling Record War Traffic

The railways are now handling the greatest volume of passenger traffic and the greatest volume of freight traffic in their history. These records are a direct evidence of the magnitude of the railways' participation in the war effort. Long trains of coaches and sleeping cars follow one another in close succession, carrying our fighting forces from one place of training to another within our country and to ports of embarkation for movement overseas. Still longer trains of box cars carded explosives, and of flat cars loaded with crated air craft are moving the matēriel of war to the support of these forces. And equally long trains of tank cars are contributing to the maintenance of civilian activities at home.

This is evidence of the part that the railways are playing in the war. It demonstrates the part that railway employees must continue to play at home if their sons and the sons of neighbors at the front are to receive the support that is essential to their success.

The continuation of this effort at its full is threatened by shortages in "critical" materials; campaigns to collect rubber and to gather in scrap are a result. Equally menacing is the scarcity of labor—a normal result of the enrollment to date of more than four million men in our armed forces and the transfer of millions more into defense industries. This makes it necessary to conserve manpower to at least the same degree that we are saving materials today. The withdrawal of 25,000 employees from productive railway service, through accidents, even temporarily, constitutes a loss in man-days that cannot be condoned in these days. And the withdrawal of 749 employees permanently through death comprises an even more serious drain on railroad manpower.

Safety a War-Time Conservation Measure

The conservation of human life is a most worthy objective of any foreman and of any supervisory officer at any time. But today it takes on added importance as a measure of conservation of a scarce commodity in the interest of our all-out war effort. As such, it demands the greatest possible co-operation from every maintenance of way employee—to insure that he so conducts his work as to insure safety of passage over the tracks and structures under his supervision and to insure also the safety of himself and his associates in the conduct of their work.

Carelessness—

May Be as Bad as Sabotage

IT HAS been said so often in recent weeks that transportation is of the same importance in our war effort as men and munitions or as the manufacture of military equipment and supplies, that the statement may already seem trite. Yet it is so true that it cannot be repeaed too often or emphasized too strongly, for we might otherwise center our attention on the more spectacular phases of the war effort and neglect the more humdrum phases, forgetting that a war can be lost as easily through failure of communications as through a lack of men and munitions. In fact, the latter can happen as a result of the former.

At a time when every activity is being carried on at an accelerated tempo and when so much depends on the regularity and dependability of schedules, both on the railways and in the factories, even temporary interference with the movement of trains may be serious in its consequences and have wholly unforeseen and disastrous ramifications. It is in recognition of this fact by the military authorities as much as it is to avoid the destruction of property that important bridges and other facilities have been put under guard.

One of the facilities, the failure of which can create, temporarily at least, a great deal of confusion and delay, is the coaling station. Kept in good operating condition, only the few who maintain and operate it, and who keep it supplied with coal, give it more than a passing thought. Let it get out of order, however, so that coal cannot be delivered to locomotives, immediately schedules will be disrupted, trains will be delayed, sometimes excessively, and it becomes a nightmare to everyone having the most remote connection with it, until it is again ready for service.

While defects or potential failures that can be foreseen and eliminated and others that can be repaired quickly without interruptions to traffic are not uncommon, fire causes most of the major interruptions and delays. Every effort should be made, therefore, to see that they do not occur. This should not be difficult, although it requires more careful supervision than is sometimes given, for if fire-prevention rules are enforced strictly, the fire hazard should be practically eliminated.

Rubbish, oily waste and rags, old paper and other inflammable material comprise a serious fire risk in coaling stations as in other buildings. Oil-soaked rubbish is always likely to ignite spontaneously, while other inflammable material may be ignited if a lighted match or burning cigarette is thrown into it. For these reasons, cleanliness should be insisted on at all times and measures taken to see that there is no laxity in this respect. Coal generally passes through the chute so rapidly that it has no chance to heat to the temperature of ignition, so that spontaneous combustion of the coal rarely occurs. On the other hand, some of the older designs have out-of-way pockets where coal can collect and remain undisturbed, and spontaneous combustion has been known to start here. Open torches have caused ignition and in some cases explosion of the finely divided coal that so often permeates the storage bins, a hazard that can be overcome by ventilation.

Whatever the cause, the destruction of a coaling station may result in serious interruption of schedules and delay to supplies that are vital to the fighting forces. Furthermore, in the present era of rationing materials it may be difficult, if not impossible, to replace the facility in a reasonable time, or at all. In such a situation, carelessness may be as serious in its consequences as deliberate sabotage, and it should be guarded against with the same energy and intensity.

Water Service—

Must Be Kept in Step With Demands

IN spite of the large part that water service men have played in making possible present-day high-speed train operation over multiple engine districts of only a few years ago, it may well be questioned whether some of them appreciate fully the importance of their contribution, and, therefore, realize to the fullest extent the responsibilities that rest upon them as the war effort of the nation continues to increase its demands on the railways. It has been said, and without fear of contradiction, that without the improvements that have been made in the quality of boiler water now generally available, the increased dependability of supplies, and the improved facilities for storage and delivery, the present high degree of dependability and efficiency of locomotive operation and present-day high-speed long engine runs would be impossible.

No one knows better than the old-timers in the enginehouse and boiler shop the benefits in reduced boiler maintenance that have been derived through the use of improved boiler water. No one knows better than the older enginemen, the improved performance of locomotives on the road when supplied with water of proper quality; and few other than the older operating heads of divisions or larger territories realize how the scientific water conditioning of the last 10 or more years has reduced their power requirements and improved train operation generally. To the man, these men, and the improved performance of their departments, testify to the value of proper locomotive boiler water. That this is true places large responsibilities upon water service men today, especially as the war effort increases its demands on the railroads for transportation, and with a degree of dependability never before required. Furthermore, in the light of the intensive use that the roads must now make of their power, and the threat of a shortage of locomotives to meet all requirements unless materials for added units are released by the War Production Board, it is evident that water service men have a more vital part to play than ever before.

In the face of the new demands being made, which are extending to new territories with little warning, there are few water service men who have no immediate or potential problems of supply, quality, storage or delivery. As conditions change, and they are changing rapidly, these men must be alert to meet the new conditions promptly. In fact, so important is this matter that some water service men are now making a complete check of their water facilities, looking to possible future requirements and means of meeting them as they

arise, with minimum delay. This act of foresight is highly commendable and is recommended to each individual road on a system basis. Such a recheck is certain to bring to light points of weakness, and where such weaknesses or points of potential weakness are found, steps should be taken to correct conditions as a safeguard against possible failure or interference with maximum train performance.

Labor Shortage—

Must Train Men Quickly and Thoroughly

WITH every passing week, the labor problem on the railways becomes more aggravated, if not serious, while the demands being made upon them increase beyond already unprecedented peaks. Each week brings new classifications of the manpower of the country as military plans are enlarged to meet prospective demands. Six months ago, men with minor physical defects were deferred or rejected for military service; single men beyond the age of 35 were considered immune from a call to active duty; those of all ages, considered essential to vital war industries, felt secure in their positions; and that married men, especially with dependents, should be called during the first year of hostilities, was beyond comprehension in a country of 130 million population. But today, all bars to military service, combat and behind the lines, have been lowered—men with defective eyes, ears and teeth, and even arms, legs and feet are being taken to relieve able-bodied men for more active service; industry has been warned that there is no such thing as the indispensable man; and Gen. Lewis B. Hershey, head of National Selective Service, has warned that married men without dependents other than a wife, and even with dependents, can expect to be called by the first of the coming year, if not sooner. Coupled with the loss of experienced men to more remunerative jobs in war industries, these signs are ominous and cannot be overlooked by the maintenance of way departments of the railroads without dire consequences. No one questions but that the military needs of the country come first, but beyond these demands, maintenance men must make every effort to counteract inroads on their forces, and must constantly recruit and train new men to fill out their ranks.

That there will always be enough men in the country to maintain the present levels of employment on the railways is no answer to the problem. They must be trained men, conscious of the hazards involved and equal to the tasks at hand if work essential to the war transportation needs of the country is to be done. Every new and untrained man in railway service is a loss to the railways and a potential hazard to himself and his fellow workers, if not to train operation, until he has absorbed at least a basic sense of railroading. And these handicaps of the untrained employee are increased with his age, a factor not to be overlooked. We repeat, therefore, that the solution of the labor problem of the maintenance of way and structures forces is not to be found in numbers alone. It must be found in an adequate number of physically able men who, with the aid of already capable officers and employees, can be converted into competent and safe employees in the shortest possible time.

New men must not be left to their own devices. Every means must be employed to make them worthwhile, safe employees—not in a period of years or months, but in a period of weeks, if not days. To accomplish this is the responsibility of officers and seasoned employees all of the way down the line. Discharging this responsibility may take the form of educational talks by supervisory officers, detailed personal instruction in the field, group meetings and even motion pictures of safe and efficient working methods, but it will never be as complete and effective as is essential unless every seasoned employee takes it upon himself to make every new employee a safe and efficient workman as quickly as possible.

At the same time, every supervisory officer and foreman must train his most capable experienced men for advancement into positions of greater responsibility, and every machine operator must train relief operators to fill any gaps that may occur. Only by these means can the ranks of the maintenance forces be kept intact qualitatively under the strain of war-time conditions, and can the present large maintenance programs, essential to the war effort, be carried out effectively.

Need Something?

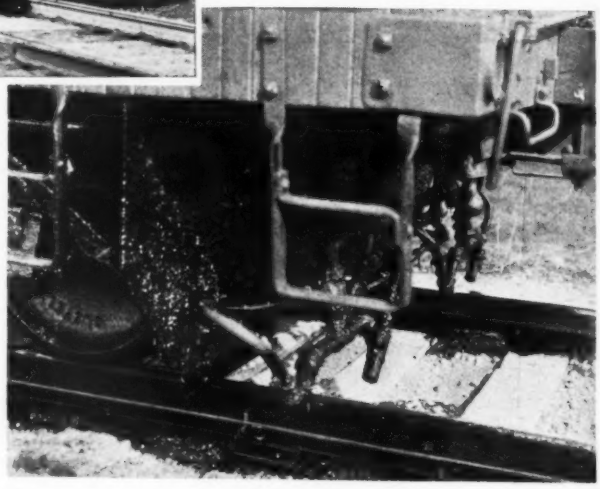
Maybe a Scrap Dealer Has It

INGENUITY alone will not solve all of the equipment and material problems of engineering and maintenance men during the trying war-time days ahead, but it has saved these men in many difficult situations in the past, especially during the depression, and to the extent to which it is employed in the days ahead, it is certain that it will pull them out of many new difficulties.

Was it not ingenuity, when other means of obtaining materials recently for a much-needed fuel oil station failed, or were impracticable, that led an engineering department officer to scour the piles of scrap dealers along his lines to fill his needs? It was, and it led to success—a fact of more than ordinary interest, because while the railways have never been adverse to utilizing good second-hand materials from their own stock piles, and are today combing their lines for all usable and reclaimable materials, few of them have ever had occasion to look to the supplies of scrap dealers.

In the instance referred to, the engineering officer upon whom responsibility had been placed to find means of fueling locomotives at the end of a war-revitalized branch line, sorted through piles of scrap in overalls and came back with his full requirements of pipe, valves and fittings, and even the necessary pump. As a result, with no drain whatever on new materials, and without the delay that would have been occasioned even if new materials could have been secured, the immediate needs of the railway were filled and the facility was installed and placed in service in a minimum of time. Is it not conceivable that local scrap dealers through the country have materials that other maintenance men need now or will need urgently before the usual channels of supply are open again?

SAVING ....A



Above — The Oiling Car Is at the Head End of the Train and Applies the Oil While Running at a Speed of 20 M.P.H. Right — Close-Up at the Front End of the Oiling Car, Showing the Nozzles in Working Position

WHILE a number of roads have, over a considerable period, taken measures to retard corrosion of rail and fastenings on their more important lines, none has done so on a larger scale, more consistently or over a longer period than the New York Central. For this reason, the practice followed on this road is of interest, especially in these days of such drastic curtailment of steel. Briefly, this consists in spraying a selected oil over the entire surface of the rail, except the running surface and the underside of the base, and over all exposed surfaces of the rail fastenings.

More than 20 years ago, the New York Central, which handles a large eastbound refrigerator traffic and which passes through a highly-developed industrial region, began to oil its rail and fastenings in an experimental way. The benefits were so apparent immediately that the practice was extended and within a short time all main tracks on its Chicago-New York line were being oiled annually. The practice was then extended gradually until at present it includes the main tracks of the Michigan Central; the Boston & Albany; the Pittsburgh & Lake Erie; the Cleveland, Cincinnati, Chicago & St. Louis and the Indiana Harbor Belt, units of the New York Central system, as well as the parent lines. Not all of the lines of these railways are treated, for some of them do not carry refrigerator traffic or pass through industrial territories, and it is questionable whether there would be any benefit from applications on these lines.

Character of Oil

Experience has shown that best results are obtained through the use of an oil having a high asphalt content, around 55 per cent, and the oil that most nearly fills this requirement is basically a distillation residue from asphaltic-base petroleums. The essential requirements of the New York Central specifications for this oil are that it must be an asphaltic oil suitable for application to the surfaces of rails and fastenings to act as a protective coating for the steel.

Obviously, oil meeting this requirement is quite heavy and does not flow freely or break into a spray easily at ordinarily atmospheric temperatures. For this reason, before it can be used effectively, it must be brought to a temperature well above that of the atmosphere, even during midsummer. It has been found necessary, therefore, to heat it with steam for 12 to 18 hours, depending on the initial temperature, before it is used, and then to hold it continuously on steam until it has been applied to the rail.

The oil is delivered to the railway in tank cars, ranging in capacity from 6,500 to 10,000 gal. As soon as it is received at the designated shipping point, generally about 48 hours before it is required, it is put on steam at the stationary boiler plant at the terminal from which the train is to be dispatched, or is heated by steam from a locomotive. When the oil has been prepared for use by heating, it is put into a train which consists of a specially-designed oiling car, the required number of tank cars, the locomotive, a bunk car for the regular attendants and a caboose for the train crew. The application of the oil to the rail is made by the oiling car while the train is running.

Generally, enough cars are assembled at this terminal to provide a sufficient supply for two days of oiling. When the train reaches the next terminal at the end of the day, the empty cars are switched out, new cars are added, and all cars containing oil are put on steam. Before they are put into the train, however, the outlet valve of each car is connected to a 2-in. supply line which reaches from the rearmost tank to the oiling car.

Valves in the supply and connecting lines are so arranged that oil flows from only one tank to the oiling car at any time. Delivery of the oil to the nozzles is effected solely by means of air pressure, obtained from the locomotive and applied to the oil

Rail and Fastenings Contribution to Victory

Materials for Victory

No. 3 of a Series

Steel is needed for munitions, military and naval equipment and related purposes, so that civilian users, among whom the railways are classed, are being restricted and probably will undergo further restrictions before the war is over. This article, the third in a series on Materials for Victory, suggests one way in which the service life of rail, and particularly of rail fastenings, can be extended as a contribution to Victory. The first article of the series dealt with the uses of timber connectors to make possible the utilization of wood as an alternate for steel in railway construction. The second article described the campaign instituted by the Illinois Central to collect scrap, reclaimable materials and unused materials and supplies on its system and the astonishing results that were obtained

through the dome of the tank car. When a tank has been emptied, the air and steam are shut off, the outlet valve is closed and the next car is cut in.

Oil Is Metered

When the oil is delivered to the oiling car it passes through a meter which can be read by individual miles, or at stated intervals, as desired. The record of the meter readings shows at a glance the amount of oil applied per mile or for any other unit of distance. Ordinarily, it is the practice to apply 90 gal. of oil per mile to old rail regardless of whether it has been oiled previously.

Oil is applied to the rail by means of specially-designed atomizing nozzles, one on the outside and another on the inside of each rail, which break it up into a finely-divided, high-velocity spray. These nozzles discharge the oil below the running surface of the rail for two reasons; namely, the discharge is thus close to the surfaces to be protected, and to a large extent the hazard of spraying the running surface of the rail is avoided. The appearance of these nozzles, in working position, is shown in an accompanying illustration.

As mentioned, a pressure of 25 lb. per sq. in. is maintained in the tank car currently supplying the oil. Inside the oiling car there are two compressed-air tanks, each 24 in. in diameter by 12 ft. long, in which a pressure of 110 lb. per sq. in. is maintained constantly. As the oil reaches the nozzles at a pressure of 25 lb., which experience has demonstrated is sufficient to maintain a steady flow, provided the desired high temperature is maintained, it is met by a stream of air from the high-pressure reservoirs, delivered at 110 lb., which not only atomizes it but imparts a high velocity which insures penetration into every irregularity of the surfaces to which it is applied.

Obviously, the best results are obtained when the thickness of the oil film, like that of a coat of paint, is uniform and of such thickness that it fully protects the surfaces, with no surplus, in which event the consumption of oil is at the minimum compatible with the purpose of its application. It is equally obvious that, since the oil is applied while the train is in motion, either automatic or manual control to vary the delivery of the oil to correspond with fluctuating speeds of the train is impractical. For this reason the openings in the nozzles, the delivery of the oil and the pressure of the atomizing air, are all adjusted so that the most desirable thickness of the oil film will be obtained when the train is moving at 20 miles an hour.

Maintain Uniform Speed

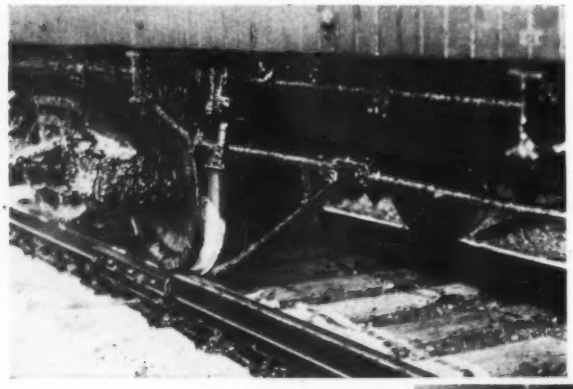
To insure that this speed will be maintained without variation, the car is equipped with a speed indicator which the oiling supervisor, who is in charge of this car, watches constantly, as do the nozzle operators and the representative from the division engineer's office, who always accompanies the train while it is on the division. If the speed rises or falls as much as two miles an hour in variation from the established speed, this fact is at once communicated to the engineman, as is any long continued variation of as little as one mile, except where slow orders are in effect and elsewhere where the operating rules require a lower speed. It is of interest in this connection that despite several sections of slow track through large industrial centers, the control of the application of the oil was so close that in a run of 140 miles, a total of 12,535 gal. of oil was applied to the rail, equivalent to 89.5 gal. to the mile for the entire distance.

Equipped With Bell and Whistle

Since the oiling car is at the front of the train and several cars intervene between it and the locomotive, the engineman does not have a clear view ahead. To insure that the required warning signals will be given on approaching highway crossings at grade, section or extra gangs at work, etc., the oiling car is equipped with a locomotive bell and a whistle, which are handled by one of the train crew. Likewise, an emergency brake valve is placed on each side at the front end of the car, where it can be reached instantly by the operators, the supervisor, or a member of the train crew.

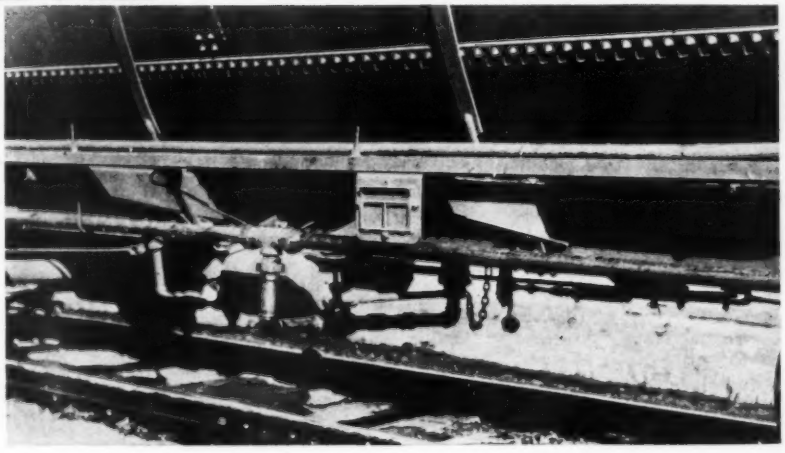
All of the controls are at the front end of the oiling car, and the operators sit behind a window which occupies most of the area of the front end of the car, with a narrow control table between them and the window.

They thus have an unobstructed view of the track ahead, beginning about five or six feet in front of the car, and over a wide angle laterally. Each operator manipulates the controls for the nozzles serving a single rail, except as will be explained. On the control table in front of each operator are two levers, one of which actuates an air-operated lift, consisting of a cylinder and a piston, located under the control table, which raises and lowers the nozzles and their connections to the oil and air-delivery pipes. The air lift raises both sets of nozzles simultaneously and, although it can be actuated by either operator, one man handles it. The other lever in each set opens and closes the valves in the oil and air delivery lines, independently for each rail.



Left—View Under the Oiling Car, Showing the Sanding Pipes Behind the Head Trucks.

Below—Showing the Connection Between the Outlet Valve of a Tank Car and the Main Oil Pipe to the Oiling Car



When the train starts out or resumes its run after a stop, it is taken back far enough to attain a speed of 20 miles an hour at the starting point. At this point the nozzles are lowered and the air and oil are turned on. When a highway crossing at grade, a turnout or other obstruction is encountered, the levers actuating the lift and the valves in the delivery lines are shoved into the closed position within a few feet of the obstruction and are returned to open positions as quickly as possible after it has been passed.

A careful watch is maintained constantly to insure that the rail is receiving the desired dosage. To facilitate this inspection, as well as to ascertain whether the nozzles are functioning as they should, a hatch is provided in the floor of the car at each end of the control table for observation of the sprays.

Diaphragm Found Necessary

When the practice of oiling the rail was started, considerable difficulty was experienced with oil deposited on the running surface of the rail. Some changes were made in the nozzles, but this did not effect a cure. It was eventually determined that the principal cause was strong currents and eddies set up by the passage of the car and that the trouble was aggravated when the wind was blowing, particularly if it was from a quartering or a lateral direction. To reduce these eddies to the minimum, a diaphragm or skirting for the full width of the car, reaching from the car floor to the clearance point above the rail, was placed back of the sprays to prevent strong currents from blowing the oil away from the rail or over the running surface.

This diaphragm has proved effective generally, but occasionally a strong quartering or lateral wind will still throw some of the spray over the rail. This is overcome by adjustment of the nozzles. To counteract the effect of any oil on the running surface and prevent slippage of the locomotive drivers, two tanks of locomotive sand, each containing two cubic yards, are carried on the oiling car, with pipes leading to the rails immediately ahead of the wheels of the rear truck of the car.

To guard against delay in coupling the supply line between the tank cars and the oiling car, a supply of pipe and fittings is carried on the oiling car, one end of which is equipped with a work bench, a vise and a pipe cutting and threading machine. In this way, any damage that may occur can be repaired or any unexpected changes that may be needed can be made, without waiting for outside help.

Not Every Year

All lines are not scheduled for oiling every year, for it has been found that after two or three successive annual applications it is possible to omit certain lines. Just what rail is to be oiled in any year, and the procedure to be followed are decided on only after an inspection of the oil film. As an indication of the extent of the practice on the system as a whole, and of the omission and inclusion of lines from year to year, the accompanying table shows the mileage of track oiled for two consecutive years, 1940 and 1941, for the constituent lines of the system. In this connection, it is of interest that since the Pittsburgh & Lake Erie handles practically no refrigerator traffic, the oiling of the rail on this line is for the sole purpose of protecting it against industrial fumes.

New York Central System
Mileage of Track Oiled in 1940 and 1941

	1940	1941
New York Central		
Lines Buffalo and East	2,425	1,484
Lines West of Buffalo	777	1,078
Boston & Albany	448	452
Cleveland, Cincinnati, Chicago & St. Louis	915	507
Indiana Harbor Belt	50	58
Michigan Central		
In Canada	217	300
In the United States	266	344
Pittsburgh & Lake Erie	252	268
Total	5,350	4,491

What Kind of a Pier?

By R. P. Hart,
Bridge Engineer,
Missouri Pacific, St. Louis, Mo.

BRIDGE piers constructed of concrete, both plain and reinforced, have been in common use for many years, and in most cases their use has been fully justified by the service they have given under severe conditions. Obviously, it is essential that the concrete in piers of this type be made of suitable materials and by proper methods, to prevent or limit deterioration resulting from exposure to the elements. Otherwise, durability and low annual maintenance costs will be sacrificed, which are the principal reasons for using concrete piers. However, by following the requirements of modern specifications for materials and workmanship, these matters can be controlled readily.

Assuming that a concrete pier is designed correctly and is built properly, it will possess the distinct advantage of long service life and minimum annual maintenance expense. Damage from the weather will be almost negligible, and no paint or other protective coating need be applied at regular intervals to avoid loss of needed section. Furthermore, concrete piers add to the rigidity and stability of a bridge structure and tend to limit vibration under moving loads. Again, the possibility of serious damage to a concrete pier as a result of a fire in the supported spans is quite remote and it is improbable that any such damage would be extensive enough to necessitate taking the pier out of service.

Foundation Must Be Stable

To gain the full benefit of the foregoing advantages of concrete piers, adequate foundations must be provided for them. The piers must either be supported on pile foundations or extended into supporting strata which will not be eroded and result in loss of stability. Founding concrete piers upon strata of rock, shale or other suitable load-carrying and scour-resisting material often involves deep excavation, with resulting high construction costs. This has caused engineers to develop other forms of pier construction which give satisfactory results, from the standpoints of both lower first cost and more rapid construction, at the same time permitting the piers to be extended to depths greater than those to which concrete piers could be extended readily without incurring unwarranted expense.

Steel Piles Useful

By using metal bearing piles—that is, piles consisting of rolled structural-steel column sections or wide-flanged beams—strata comprised of shale, gravel, compacted sand, etc., usually can be penetrated to such depth as may be necessary to prevent underscour and provide the required stability. It is comparatively simple to drive such steel sections as piles, arranged in bents or groups so that they can be capped with metal beams or reinforced-concrete caps.

If the height between the caps and the ground line is sufficient to demand it, adequate steel bracing can be riveted or welded to the piles to provide required strength or stiffness. With this type of pier, the application of paint or other protective coating becomes a problem and results in annual maintenance expense. Where foul water is or will be in contact with the piles, special attention should be given this protective coating to prevent loss of needed section through corrosion.

Metal bearing piles can be secured in lengths up to 80 ft. or longer, and can be driven to depths considerably greater than 100 ft. Where necessary, two or more sections of piles can be spliced during the driving to secure the desired penetration, to accommodate driving equipment or to meet other conditions. Splices should usually develop the full section of the pile and this can be accomplished by butt-welding the main sections and welding on side plates.

While concrete piers are usually designed with round or V-shaped ends and with smooth sides, so that floating drift does not collect easily, the open construction resulting from the use of metal piles and necessary bracing forms an excellent trap for the accumulation of such drift. It is desirable, therefore, in some cases, to provide a sheet-metal jacket around the outside of metal bearing-pile piers, making this of such thickness that it will not be torn off readily or rusted away, and anchoring it securely to the piles or bracing of the pier. The piles should not be boxed in completely so that they cannot be inspected readily and frequently for rust deterioration, or kept protected, as necessary, with paint, of other coatings.

Sheet Piles for Piers

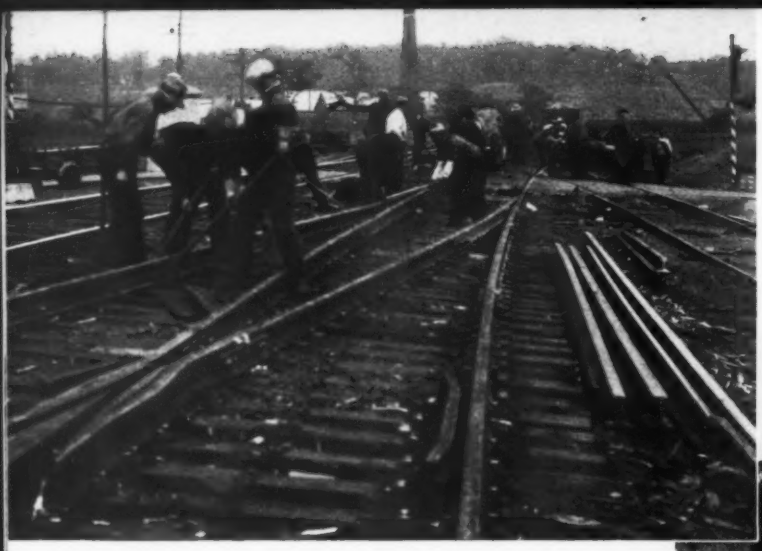
While they are often used in the temporary construction of cofferdams for piers, metal sheet piles are also frequently incorporated in permanent pier construction. With an interlocked ring of such piles, the points of the piles can be driven to considerable depth through sand, gravel or sand-and-gravel strata to shale or rock, and this sand or gravel will be so confined as to provide suitable support as a pier, if it is capped in such a way as to distribute the superimposed load over the area enclosed by the interlocked sheet piling.

If, on the other hand, it becomes necessary for stability, to provide anchorage for the pier to the rock or shale stratum at the points of the piles, it will be practicable to excavate the sand or gravel within the area encompassed by the interlocked sheet piles, install the required anchors and replace the sand or gravel with plain or reinforced concrete. The sheet piles can then be left in place for added protection or as reinforcement. This should result in greater economy than the use of massive piers that require extensive excavation for large footings at a considerable depth.

Concrete Piles Have Place

Piers of concrete masonry in the form of concrete piles capped with reinforced concrete should be considered in preference to other types of piers where conditions are favorable for their use, since they can usually be built at lower cost than any of the foregoing types. Concrete-pile piers are most suitable at points where piles can be driven with sufficient penetration to carry the desired loading and where erosion of the supporting soil around the piers will be limited or negligible. Where the height of the pier from the cap to the ground is sufficient to demand it, concrete collars at the ground line, or other suitable bracing, should be cast around the piles after driving, to provide adequate strength and rigidity.

When considering the installation of a pier, careful study should be made of the relative advantages of piers constructed of different materials and types of designs. The design selected should be that which is most adequate to meet existing conditions, consistent with the expected or desired life of the structure and greatest economy.



A Shortage of Rail Demands That All New Rails Be Laid Carefully and That Rail in Track Be Kept in Good Surface to Secure Maximum Service Life

MATERIALS—

How Can We Get the Most From Them?*

By J. B. Martin

General Inspector of Track
New York Central, Cleveland, Ohio

In this article, a maintenance officer with many years of practical track experience, discusses the importance of conserving materials as a necessary means for aiding war production and explains what measures the railroads can take to insure that the utmost in service life is secured from the materials in the tracks and from repair or renewal materials by proper installation, by proper maintenance or care, by the recovery of all salvage and scrap, by the reuse of all material that can be reused and by caring for and obtaining the utmost service from work equipment

WE ARE now involved in the most serious conflict which we have ever faced. Out of this will come many perplexing problems. The most serious at present is that of material shortages. The extent of our effort in this war is so stupendous and its material requirements are so great that shortages will develop in practically all classes of materials. We are experiencing some now and more will follow. In his address at the A.R.E.A. convention in March, Andrew Stevenson, chief of the Transportation Branch of the War Production Board, gave a clear outline of the material problems facing the railways and of the system of priorities and preferences, and asked, "How will you meet these problems? Will you ask for what you want or for what you need?" I am sure your answer will be, "I'll ask for my absolute needs and I'll conserve and save and make the best of what I have." To meet the problems of material scarcities that develop will require imagination, courage and hard work and each of us must bear a heavy responsibility.

We have gone through several years of rigid economy during which many good practices were developed for conserving materials or using substitutes, and descriptions and discussions of these practices appear in the proceedings of the American Railway Engineering Association, the Roadmasters' and Maintenance of Way Association, the Bridge and Building Association and other organizations. Articles on this subject have appeared also in the technical journals and it might be profitable for all of us to refresh and stimulate our memories by reviewing articles and records in our files of proceedings and journals.

We are already experiencing a shortage of new rail and we will not be able to get all of our requirements for the duration. Experience has proved that the life and usefulness of rail depend on good workmanship and strict adherence to good practices in the care of new rail. The application of these principles and quality of work, rather than production, should now be the measuring stick more than ever before, for rail laid in accordance therewith will have a longer life and will require less application of material and fewer man-hours of labor during its life.

Good workmanship should apply not only to the application of new rail but to all work. We have better organization, equipment and tools than ever before and, if properly used, they will produce better and more work

*Abstract of an address presented before the Maintenance of Way Club of Chicago.

than were formerly considered possible. Nothing is more wasteful of material than poor workmanship, whether it is on the track, bridges, buildings or in the shops. Material does not function properly and its life is shortened by improper application. Spikes improperly driven, bolts with crossed threads, tie plates or anchors not properly placed are some evidences of poor workmanship.

Care of Old Rail

During the war, it will be necessary to carry over rail in tracks that normally would be renewed. This may mean that more labor will have to be applied to these sections of track than would be the case normally; but it is one of the conditions that must be met. Light or old rail can be maintained to provide safe and comfortable riding track if the tie and ballast conditions are good. Surfacing and tie renewals on old rail are sometimes neglected with the thought in mind that the rail will be renewed at an early date and that it is not economical to expend much labor on surfacing and tie renewals until the rail is renewed. This attitude may be questionable even in normal times, but with conditions as they are, these items should not be neglected. Surfacing on old rail requires close attention, especially the tamping, and particular attention should be given ties under the joints.

Everybody agrees that the joint is the weakest and most troublesome part of the rail but there is much that can be done to improve joint conditions and conserve the rail. Joints can be brought back to the original surface by rail-end welding and grinding, for which methods have been highly developed. Joint bars should be kept in good condition and, if worn, should be renewed with new straight, crowned bars or reformed bars. The bars can be made oversize, if necessary, to compensate for wear on the underside of the head and on the base. Both the rail ends and the joint bars should be well lubricated with a good lubricant when the bars are applied or by using a lubricating packing which is now available.

On tracks subject to brine drip, serious damage to the rail and the joint bars occurs at the receiving end of the bar unless it is protected by blocking at the end. Brine deposited at this point is drawn back of the bar by the suction created by trains. Where tracks are subjected to considerable brine drip, the damage to rail and fastenings will be serious and it is economical to make an out-of-face application of oil by the Neafie method.

It is important when applying joint bars that they be properly placed and seated and that they are drawn up fully and not cocked. The bolts should be tightened to a uniform tension and care must be taken not to overtighten them and stretch the bolts or freeze the joints. They should be maintained in good condition, with a regular program for tightening, and not be allowed to remain loose, as there is nothing more damaging to rail ends and joint bars than loose bolts. A proper expansion gap should be maintained between the rail ends and sufficient anti-creepers applied to prevent rail creepage. The anti-creepers must be kept functioning—if they are loose or are laying in the ballast, they are worth more in the scrap pile than where they are. Rail ends should be slot-ground and beveled frequently enough to prevent chipping.

On curves it is important to maintain correct alinement and elevation. Variations in surface will produce imperfections in alinement and, in turn, cause uneven flange wear on the high rail. It is practical and economical in many cases when the high rail becomes flange worn to use it to replace the low rail, with longer life resulting than from an installation of new rail, as the flange worn rail on the low side will act as a frictionless rail. If the low rail is in fit condition, it can be used, in turn, on the high side. Flange lubrication will conserve rail on sharp curves that carry a heavy tonnage.

Clean Ballast Promotes a Dry, Stable Track Structure and Increases the Life of its Component Parts

Conservation of Ties

Today nearly all tracks are laid with treated ties. Treated timber is also used extensively in wooden bridges and for decks on steel structures. With care it will have a much longer service life than untreated timber. Treated material should be handled with care to avoid damage. Picks should never be used to move new ties and they should not be struck with bars or picks when tamping. Tamp the ballast and not the ties. Ties should be plated with plates of proper design and size. Proper gaging and spiking will help to avoid respiking and damage to the ties. Spiking during periods of low temperatures when the ties are full of frost is very apt to cause splitting, especially in hardwood ties, and result in serious damage.

When timber and ties are stored on the right of way they should not be piled where other property will be endangered in case of fire and they should be placed in small piles and be protected by fire guards. Careful inspection of ties and timbers removed

Treated Ties Should Be Installed With Care to Insure That They Will Not Be Damaged and Their Life Shortened

from tracks and structures will reveal some that can be reused for posts or blocking, or ties that can be used in certain side tracks.

Every opportunity should be taken to clean dirty ballast, which will improve track conditions and conserve rail and ties. Many short stretches of foul ballast can be cleaned with a comparatively small amount of labor. Foul street and highway crossings produce bad track conditions and result in damaged rails and ties. Many roads have the equipment, and track conditions can be greatly improved by major ballast cleaning operations.

Switch and crossing frog materials comprise a large item on every railroad. Much special steel is used in the construction of such materials which will now be difficult if not impossible to secure and every effort should be made to conserve the present installations. The maintenance of frogs and switches begins with their installation, which should be made in accordance with plans and prevailing standards in order that they may function properly and to insure long life. Frogs must be supported on good ties and clean ballast and given the best drainage that can be provided. In switches, good drainage should also be maintained and the switch ties should not be allowed to deteriorate to the point where they become a detriment to maintenance.

Scrap and Reclamation

The life of turnouts and crossing frogs can be extended greatly by welding and grinding and by maintaining them in proper gage and adjustment. Improperly bent or improperly placed stock rails cause excessive wear on switch points, and guard rails improperly placed or gaged cause excessive wear on frogs. Bolts in switches and crossing frogs should be kept tight and worn bolts replaced. Switch point protectors are a good investment at many points. Moving switch parts should be well lubricated.

Watch the scrap piles; scrutinize them closely and ship the scrap promptly. Usable materials or materials that can be reclaimed should be put in condition and sent where they can be used. Every rail removed from track, particularly from main tracks, should be given careful consideration as to its further use in main tracks, sidings, for cropping, or for frog, switch or guard rail purposes. Many tie plates can be reclaimed and repunched for different rail sections. If they have flanged bottoms, the flanges can be sheared off cheaply and provide a usable flat-bottom plate.

Inventories will require close watch for a surplus of any material in excess of immediate requirements, which should be returned to stock for redistribution to points where there is immediate need for it. A careful canvass will often reveal a surprising amount of excess tools and supplies. Material is frequently held at outlying points for convenience or to protect a possible emergency which probably will never occur and sometimes such material becomes obsolete. Tool houses and their basements and lofts often become storehouses for unneeded and forgotten materials.

A Potential Shortage of Work Equipment in the Face of Large Maintenance Programs Demands That It Be Maintained to the Highest Standard of Efficiency

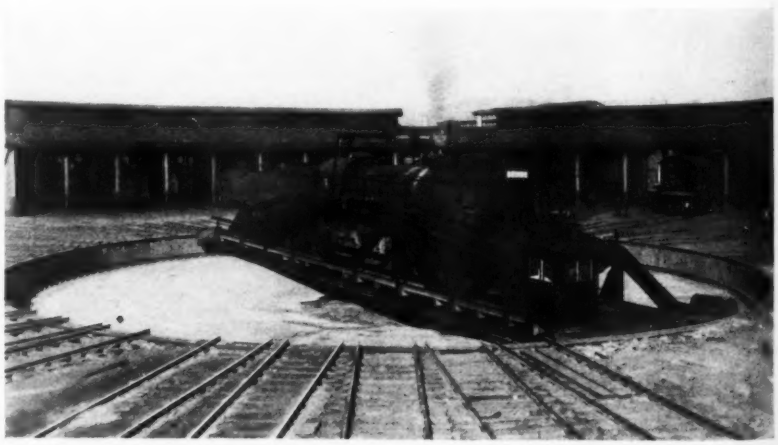
Work Equipment

It is pretty certain that additional work equipment will not be available and this makes it essential to get the best possible use from the equipment we have. This will require careful study, programming and the full cooperation of all concerned. It may mean double shifts for much of the equipment in the months with sufficient daylight to make this practicable.

Equipment should be kept in good repair, as it has little value if it is subject to frequent breakdowns. If kept in good repair and operated by competent men, it will give a good output day by day. Equipment operators should be selected with care. They should be familiar with the machines in their charge, know their limitations and give them proper care, such as lubrication, adjustments and minor repairs.

Cars loaded with company material must be released promptly. Their use should be restricted to real needs and the full capacity of the cars should be utilized as nearly as possible. Work train activities should be planned carefully to avoid any unnecessary use of power and equipment.

The problem is before us. It would be rash indeed for anyone to predict what materials or quantities may be available, but a careful study should give a fair indication of what our needs are now and what they will be for some time. We should get this picture in our minds and make long-range plans about what we will do to conserve and save what we have. We must start to conserve and save now.



More Than 100 Locomotive Movements Are Handled Daily on This 110-Ft. Electrically-Driven Turntable at One of the Southern Pacific's Busiest Enginehouses in California. Photograph Courtesy of Westinghouse Electric & Manufacturing Co.

The Will To Be *Safe*

A War-Time Necessity

If a Man Is Once Trained to Be Safety Conscious, He Will Usually Stay That Way Indefinitely

By Armstrong Chinn
Chief Engineer, Alton

IT is axiomatic that no man in his right mind wants to get hurt. It is also true that, with modern safety teaching, most men know how to keep from getting hurt. This being the case, the question may be asked, why is it so many men receive injuries that they do not want and know how to avoid? This question has received the attention of safety men and students of human nature for many years without conclusive results. Progress has been made but a final answer has not yet been found and probably never will be. This is borne out by the fact that after many years of teaching and training safety, 80 to 85 per cent of the injuries occurring in the maintenance of way department, as well as in other departments, of our railroads are still due to faulty human behavior, while only 15 to 20 per cent are due to unsafe conditions. The human element, therefore, offers a great opportunity for accident reduction.

A State of Mind

Safety consciousness is a state of mind. No matter how completely we may surround a man with safety appliances and rules, he will not be a safe worker unless he is safety conscious. It is an old saying, but a true one, that the best safety device known is a careful man. We spend too much time devising and talking about safe tools and safe conditions and not enough in training our employees to be safety conscious.

Men are born with the instinct of self-preservation but, unless they are trained, they will not develop and use this instinct to their full capacity. No one ever heard of a man being born a good section foreman; he had to be trained for it and it usually took many years. In the same manner a man, to be a thoroughly safe worker, must be trained to be safety minded, trained until, like a good automobile driver, he will subconsciously do the safe thing at the right time, no matter how great the stress under which he may be working at the moment. This desirable state of mind cannot always be developed in all men, as is shown by our continuing toll of avoidable accidents, but at least it is a worthy goal toward which we can strive.

With these thoughts the problem logically divides itself into two parts: (1) Why do men forget safety, particularly at times when they need it most? and (2) How can we train our men to make them as continuously safety conscious as possible?

In dealing with the first question, we should begin with the new employee, the man who is inexperienced, who has not been trained in his work or in safety. This man may injure himself because of his lack of knowledge of the work that he is to do and of ways in which to protect himself while doing it. We cannot say that such a man has forgotten safety as he has not yet been made aware of it. His first need is training in both his work and safety and, until he receives this training, his foreman should watch him carefully and see that he works with a more experienced man and is not assigned to work of any kind beyond his knowledge or his physical capacity to do.

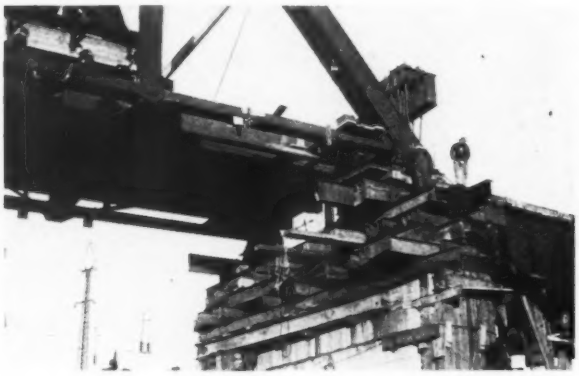
Safety Training Will Stick

If a man is once trained to be safety conscious, he will stay that way, no matter to what extent he may change the nature of his work. During the last depression, we had a large track improvement program under way in preparation for faster schedules, and put on several extra gangs to do the work. A number of our shop and car men, who were furloughed at the time, asked for employment in these gangs. We put them on with some misgivings as to their ability to take care of themselves while doing work that was new to at least most of them. They were given safety talks before they started and, hoping for the best and expecting the worst, we let them start. During that season we had the usual run of personal injuries, not to the shop and car men as we had expected, but to the experienced track men, the "old heads" who should have known better. These new men had been well trained in safety before they came to us. They listened to the safety talks that were given them before and after they started work. Because they were safety trained and, consequently, safety minded, they had no trouble in understanding these talks and ap-

Abstracted from an address presented before a regional conference of the Safety Section, Association of American Railroads, at Chicago.

plying the principles of safety to their new work and, as a result, they got along better than the regular trackmen. In other words, they had minds that were trained in safety and they used them.

It has been well said that no hand ever reached out deliberately and placed itself in danger; no foot, of its own accord, ever placed itself under a falling weight; no machine or tool ever went after a man with intent to injure him. No, it is always the mind, directing the actions and directing them improperly, that causes the accidents. The trained mind, directing the actions with thoughtful care and safety, will seldom get the body in trouble.



"The Human Element Offers the Greatest Opportunity for Accident Reduction"

Traits in Men

Students of human behavior have studied why a man forgets or neglects to do the things that he knows he should do for his own safety. They have found numerous causes that, in one way or another, have an effect, and often a bad effect, on a man's behavior. I will cite a few of them.

Mental Make-Up: A man is controlled largely by his mental make-up. Part of this is inherited and cannot be changed by outside influences and part is the result of environment and is responsive to leadership and training. It is in this latter part that we have the opportunity to improve a man's safety attitude.

Physical Make-Up: This includes a man's constitution, his type of build, his state of health at present and as affected by previous state of health. He may be a natural "slow-poke," and not of much value in an emergency, or he may be restless and dynamic, looking for competition, a fight, or other outlet for his energy.

Attitude: Under this heading we find the mental dwarf who wants to look big; the man who knows better but reasons "Let the foreman worry, he's the boss"; the fellow who is resentful; the man who isn't sure of his job and worries about its security.

Leadership: Poor supervision on the part of the foreman, conflicting with the better judgment of his men, or the morale of the men in the gang at a low ebb due to domineering tendencies of the foreman, may result in a disturbed mental equilibrium in the men. Good leadership is the first essential of good work.

Fear: Resulting from constant threats of the foreman or from an inferiority complex in the man himself.

Irritability: Improper rest; worry about family, money, or other troubles; poor health, or impatience with the details and progress of the work, can cause a man to be in a bad and unstable frame of mind.

Accident Proneness: Some men are born clumsy, and no amount of teaching or training will keep them from having accidents. So far as possible, such men should be used on work they can perform with reasonable safety to themselves and others.

Inability To Make Decisions: There are men who find it difficult to make up their minds, and even when they finally do, they are not sure that their decisions are right.

Mental Immaturity: In men of this type, the faculty of digesting and understanding written and verbal instructions is missing or is only partially present. They find it difficult to display ordinary common sense and therefore are likely to get into trouble.

Duality: Some of us are aware that within ourselves the mind takes two attitudes toward things. This is a normal mental sensation. Whenever an idea comes into the mind, an opposite idea or notion comes with it. That is why we debate things in our minds. Nervous people are especially aware of this mental activity. This is sometimes exhibited in a man who knows the rules and that he should obey them, and yet ends his mental debate by thinking, "To hell with the rules."

Over-Expectations: A foreman or a supervisor who expects more from a man than he is capable of doing will soon create a feeling of hostility between himself and that man. Because a man's father or brother was particularly efficient in doing certain things, it does not necessarily follow that the man also will be good at them.

Comparisons: Nothing will rankle a man so much or do more to destroy relations with his foreman than to have the foreman compare him unfavorably with another man, particularly in the presence of the other man or the gang.

Failure to Understand: The rules and instructions may be clear to those who issue them but they may not be thoroughly understood by those who have to carry them out. Before a job is started, all who are to take part in it should be thoroughly informed and should understand what they are to do and exactly how they are to do it.

"Men Are Born With the Instinct of Self Preservation but, Unless They Are Trained They Will Not Use This Instinct To Their Full Capacity"

Sense of Danger Fades

I have long held an idea that one of the reasons why many of our men get hurt is that they are surrounded with so much safety that they begin to feel so safe that their sense of danger is lulled and they cease to think, cease to take the necessary precautions to protect themselves, and thereby become good prospects for accidents. I will illustrate what I mean in this way. Suppose two tired men seat themselves, one in a deep easy reclining chair, the other on a high

stool with nothing to lean against. The man in the easy chair will likely go to sleep because he feels comfortable and safe, while the man on the high stool will stay awake because he knows that if he goes to sleep he will fall off. His sense of danger keeps him awake. So long as men sense the danger in what they are doing and guard against it, there is little likelihood of their getting hurt. While I am a firm believer in teaching and preaching safety to our men, I think that we should be very careful that, in doing so, we do not destroy their sense or awareness of danger which, after all, is the best protection they have.

How Train Men?

How can we train our men to make them as continuously safety conscious as possible? First of all, if we are to keep our men continuously safety conscious, we must, in some way, keep them continuously interested in safety. Men will talk about and think about those things that interest them. For instance, you know how easy it is to get a fisherman to talk about fishing, a baseball fan about baseball, or a golfer about golf. When we get our men thinking and talking about safety, our problem is half solved for they will instinctively do the things that they carry in their minds. To get men to think about safety we must convince them that it is good for them in a very real and personal way. You have noticed how willingly, almost eagerly, men will do what they think is good for them. When men become genuinely convinced that safety is good for them, they will become interested in it and take to it as naturally as they do to their religion. But safety, like any of the good things of life, does not come easily; we must work for it.

Experience has shown that men who do not take an interest in safety and who do not attend safety meetings are the ones most likely to get hurt. If we expect to have employee interest in safety, we must first have that kind of management interest that will make the employee feel that the management has his personal welfare primarily at heart and not the company's pocketbook. Convince your men that safety is good for them and they will become interested. When they are interested, they will think and talk safety. When they are thinking and talking safety, they will be safe men.

Some times, in our efforts to teach safety, we lose sight of the fact that we cannot teach safety alone, but must teach it as a part of the work our men are put on the payroll to do. When a section foreman takes his gang out on the track it is primarily for the purpose of doing certain work necessary to maintain the track. Our job, therefore, is to teach him and his men to do their work well and to take pride in doing it well, for to do it well it must be done safely.

The maintenance of way department of a railroad is spread from one end of the line to the other, and because of this fact, the men cannot always get to safety meetings; neither can the safety supervisor get to these men with any degree of regularity. For these reasons we must depend upon our section and gang foremen, who are with their gangs every day, to teach their men safety. A foreman must be skillful in doing this. He must, first, win the respect and confidence of his men so that they will feel that he has their best interests at heart and recognize that what he is doing is for their own good. Then, he must use skill in the way he teaches safety. He must present it in different ways and by different means in an interesting manner as often as he can.

Daily Suggestion Valuable

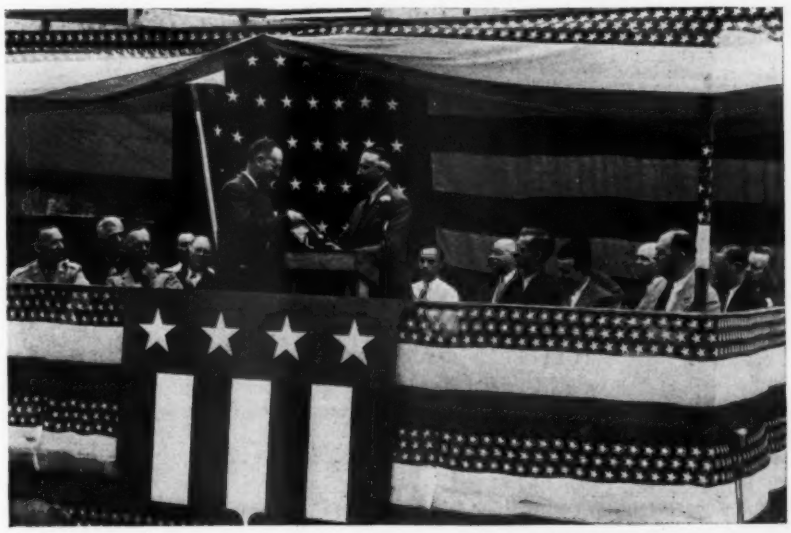
I have known foremen who kept their safety rules, bulletins and instructions in a handy place in their tool houses and then, in the last few minutes before the gangs started to work, would select some one safety thought from this supply of safety lessons and read it to their gangs, so the men could discuss it and carry it with them to their work. By selecting the lesson for each day on a different subject, and usually applying it to the work for that day, interest is maintained. Since the lesson is short, the men are not "fed up" with it and start to work with safety in their minds.

Like anything else, safety teaching can be overdone and when it is men will tire of it. Men often turn against programs that nag at them. To avoid this and yet keep safety constantly before our men, good use can be made of safety signs, posters, and slogans put up at selected places where the men cannot help but see them. The safety thought carried in these messages is usually short and to the point and can be read and understood at a glance. The men are not required to read them, but since they cannot avoid seeing them, the messages they carry are, consciously or unconsciously, transferred to their minds where they do their good work.

The skillful foreman will get his men to talk about safety and to express their ideas on safety practices. People are apt to retain in their minds and believe the ideas that they put into words.

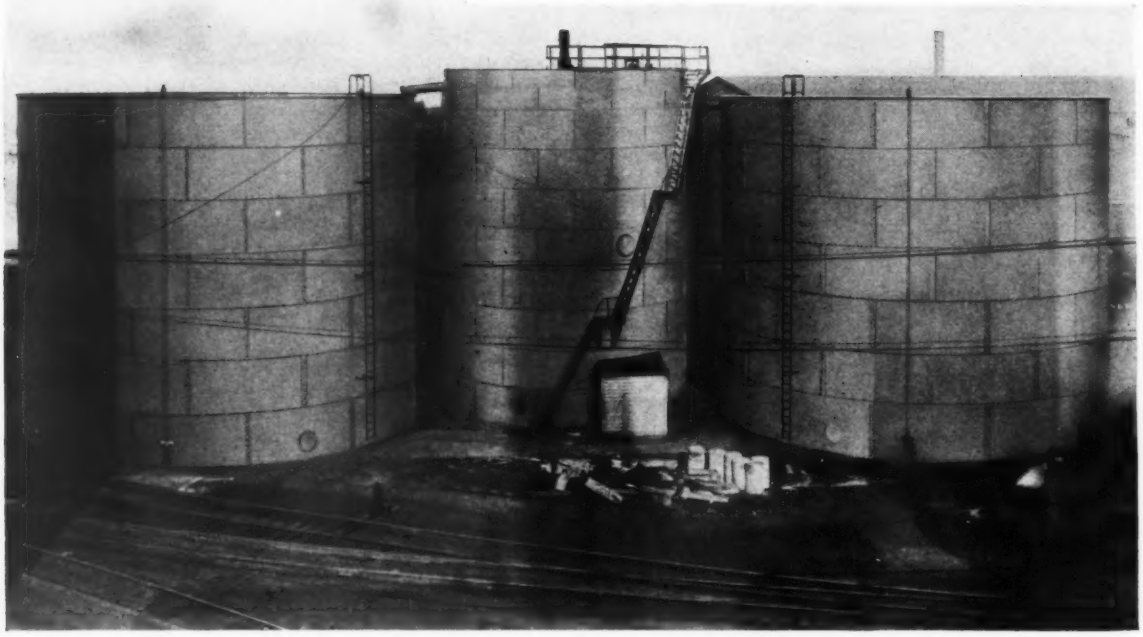
Our section foremen have done an outstanding job in teaching safety to their men. Any improvement in their teaching methods must come from us. If we furnish the ammunition, our foremen will use it. They are the backbone of the safety we advertise in the service we sell to the public, for on them rests the responsibility for the safety of the track, the foundation on which our safety of operation begins.

"Wisdom is knowing what to do next; skill is knowing how to do it; virtue is doing it."



Recent Ceremony at the Oliver Iron & Steel Corp., Plant at Pittsburgh, Pa. During the Presentation of the Treasury Department's 10 Per Cent Flag for Purchase of War Bonds by Employees. Theodore F. Smith, President of the Company, at the Left, Is Seen Accepting the Award

Increases Capacity of



The Treating Tank and the Two Original Storage Tanks at McKees Rocks as They Appear Today

UTILIZING the existing treating tank, the capacity of the important water treating plant of the Pittsburgh & Lake Erie at McKees Rocks, Pa., has been substantially enlarged, the operating efficiency of the plant has been greatly increased and the quality of the water produced has been considerably enhanced. All this has been achieved by replacing the existing mechanism in the original treating tank with an improved system that employs an entirely new principle in water treatment—a principle which, among other features, results in a considerable reduction in the water detention time required. As part of the work of converting the plant, a complete system of chemical feeding and proportioning equipment, largely automatic in operation, was installed.

Incidentally, while the conversion of the McKees Rocks plant was carried out before the present emergency arose a description of the new system installed there is particularly timely now in view of the necessity that has been imposed on the railroads of adopting expedients for promoting efficiency that require a minimum of critical materials. In this instance, the greater volume of treated water that had become necessary at an important engine terminal because of the growth of the company's business was made available by installing a more efficient system in the existing treating tank. In other words, the consumption of critical materials was confined to the nominal quantities required to make the necessary internal changes in the present tank. Another important consideration in the light of today's problems is that the improved locomotive performance resulting through the availability of the necessary quantity of properly treated water is contributing to the ability of the Pittsburgh & Lake Erie to handle its share of the burden of war traffic with maximum efficiency.

Had Kennicott Plants

Before proceeding with a detailed description of the work carried out at McKees Rocks, it may be pertinent to review briefly certain phases of the history of water treatment on this road. About 1903, this company, having become convinced, even at that early date, of the advantages of treating boiler water to remove scale-forming solids, embarked on an extensive program of construction of water-treating plants at all points where road engines were supplied with water. A total of 10 water-softening plants of the Kennicott type were constructed, including one at the important division point and engine terminal at McKees Rocks, near Pittsburgh, Pa., more water being consumed at this point than at any other location on the road. The plants that were built in this program varied in capacity from 15,000 to 60,000 gal. per hr., the largest being that at McKees Rocks and the smallest being located near the company's passenger station at Pittsburgh. In addition to supplying water columns in the vicinity of the station, the latter also furnishes water to a steam power plant operated by the railroad.

These early water-treating plants utilized the cold lime-soda ash process and were designed for continuous treatment. At each plant the complete water-softening process was carried

Large Water-Treating Plant

with Minimum Use of Critical Materials

In recent years the demand for locomotive boiler water at the important McKees Rocks, Pa., engine terminal of the Pittsburgh & Lake Erie has outgrown the economical capacity of the existing Kennicott-type treating plant. As described in this article, the necessary increase in capacity was obtained by converting the existing treating tank into a "double-deck" Permutit Spaulding precipitator, and installing a complete complement of chemical feeding and proportioning equipment

out in a vertical cylindrical tank. The raw water and chemicals, mixed in the proper proportions, were introduced into the top of the tank, from which point they passed downward through a downcomer to the bottom of the tank, and then upward through a series of perforated conical baffle plates, the purpose of which was to catch any remaining precipitate. As the treated water reached the top of the tank it passed through an excelsior filter and was then drawn off into the storage tank. Sludge from the treating process settled to the bottom of the tank where discharge outlets were provided for removing it.

At McKees Rocks

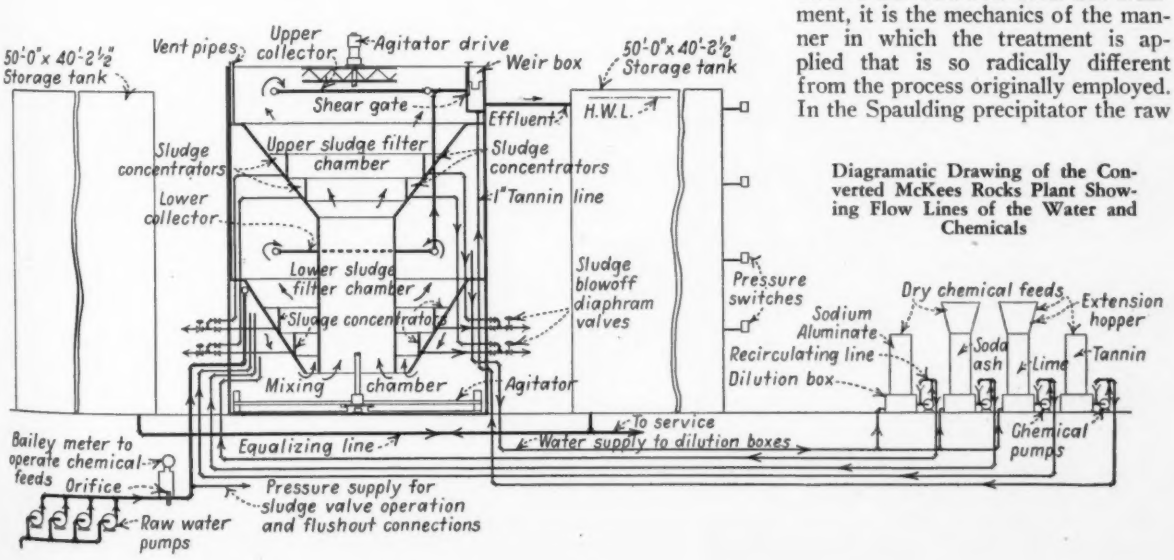
The Kennicott plant at McKees Rocks consisted of a treating tank, 32 ft. 7 in. in diameter and 43 ft. high, which was flanked on each side by a 570,000-gal. tank 50 ft. in diameter and 40 ft. high. Originally the water supply came from a shallow well. Some time later, however, deep wells were driven, partly on account of the partial failure of the shallow well and partly because of the increased demand for water. At the present time the supply is obtained from four deep wells, each equipped with a motor-operated turbine pump. Three of these pumps have a capacity of 500 g.p.m. each, while the fourth has a capacity of 1,000 g.p.m.

In recent years it had become evident that the demand for water at McKees Rocks had outgrown the capacity of the treating plant, having reached a total of about 1,250,000 gal. per day. As a matter of fact, in an effort to obtain sufficient treated water to satisfy the demands of the terminal, water was being put through the treating tank so fast that an excessive amount of precipitate from the treating process was being carried over into the storage tanks. It was decided, therefore, that steps would have to be taken to effect a substantial increase in the capacity of the treating plant.

After a careful study of the problem, it was decided that the increased capacity could be obtained most economically by the installation of a Spaulding precipitator in the existing treating tank, thus introducing a relatively new system of water treatment. While it was decided at the same time to convert the existing plant near the Pittsburgh passenger station in a similar manner, the McKees Rocks installation is by far the larger of the two.

How Precipitator Works

Although the Spaulding precipitator, as installed at McKees Rocks, utilizes the cold lime-soda ash treatment, it is the mechanics of the manner in which the treatment is applied that is so radically different from the process originally employed. In the Spaulding precipitator the raw



Diagramatic Drawing of the Converted McKees Rocks Plant Showing Flow Lines of the Water and Chemicals

Interior View of the Chemical House at McKees Rocks, Showing the Dry Feeders

water and the chemicals are introduced into the mixing zone of the treating tank where they are agitated and the sludge particles kept in suspension by the action of slowly-revolving agitator blades. At some point near the bottom of the tank the water and precipitates pass through a constricted opening into what is known as the filter zone, wherein a filtering action takes place as the water passes upward through a filter bed consisting of the sludge particles that are carried over from the mixing zone. It is the manner in which this filtering action takes place, involving the bringing together of the water and sludge in intimate contact in both the mixing zone and the sludge-filter chamber, that comprises the unusual feature of this water treatment.

The sludge-filter chamber of the treating tank is so constructed that it gradually increases in cross-sectional area from the bottom upward; hence, as the cross-sectional area becomes larger, the upward velocity of the water decreases and a level is reached in the filter zone above which the upward rate of flow of the water is not sufficient to carry the sludge particles. Thus, a bed of suspended sludge particles is formed through which the filtering action takes place. Water that emerges from the top of the sludge bed is considered to be completely treated and is drawn off to the storage tank.

The level of the top of the sludge filter is determined by several factors, including the rate of upward flow of the water, the size of the sludge particles and the amount of sludge present. As the particles of the sludge filter become coated by the finer particles rising into the filter section, they gradually become larger until the upward velocity is no longer able to retain them in suspension. These larger particles then descend again into the mixing chamber, so that there is a constant flow of particles from the mixing zone into the filter section and a flow of larger particles in the opposite direction. By this action approximately the same concentration of sludge particles is maintained in the two zones. Because of the action of the agitator blades, the sludge produced in the treating process is never allowed to settle to the bottom of the tank. Removal of excess sludge is accomplished by drawing it off automatically from sludge-concentrator pockets located in the filter zone at the same rate at which new sludge is being formed.

"Double-Deck" Unit Installed

Giving consideration to the characteristics of this system of treatment, the railroad concluded that it could effect a substantial increase in the capacity of the McKees Rocks plant by installing a Spaulding precipitator in the existing tank. Investigation disclosed that this tank would be particularly adaptable to this purpose, for it was of sufficient height to permit a "double-deck" precipitator to be installed, that is, one with two sludge filter zones, one above the other, a single mixing zone serving both filters. Obviously, this was an important factor in making it possible to effect a substantial increase in the capacity of the plant. Also, since the agitator in the treating tank prevents the sludge from settling out, it was felt that the precipitator would have the added advantage of resulting in more effective use of the chemicals. Accordingly, a precipitator with a designed capacity of 120,000 gal. per hr. was installed in the original tank.

As part of the work of converting the treating plant, a complete complement of modern equipment was installed for feeding and proportioning the chemicals, the modern nature of the installation being indicated by the fact that it is so designed that one man, working an eight-hour shift daily, is able to supply all the manual attendance required to keep the plant in continuous operation, including that needed for the operation of the raw-water pumps. Coincident with the revamping of the treating plant, the storage capacity for treated water was increased substantially by installing a new all-welded steel tank of 570,000 gal. capacity, the dimensions of this unit being the same as those of the two existing tanks, 50 ft. in diameter and 40 ft. in height.

Preparatory to carrying out the work at McKees Rocks, the existing interior mechanism of the treating tank was removed in its entirety, and necessary repairs were made to the tank shell, including the renewal of a section about 30 in. deep at the top. Also, a concrete floor was laid in the tank to obtain the flat surface necessitated by the requirements of the new system. The "double-deck" Spaulding precipitator was then installed, the essential features of which are shown in the accompanying diagrammatic drawing. The chemicals used are lime, soda ash, sodium aluminate and tannin.

From the drawing it will be seen that the mixing chamber is at the bottom of the tank and that the raw water and chemicals, except the tannin, are introduced into this chamber through separate feed lines. Directly above the mixing chamber is the lower sludge-filter chamber which, with the characteristic sloping bottom, occupies the annular space outside of a cylindrical up-flow passage, located in the center of the tank, which extends from the mixing chamber to the upper sludge-filter chamber. The latter chamber has a hopper-like bottom which forms the top of the lower sludge-filter chamber.

In each sludge-filter chamber there are a number of sludge-concentration

The Treating Plant at the Pittsburgh Station Shown Here, Was Converted in the Same Manner as that at McKees Rocks

pockets from which the sludge is removed through pipes fitted with solenoid-operated diaphragm valves that are actuated automatically by a time switch. There are four of these sludge blow-off valves and their operating mechanisms are so interconnected with the automatic control feature of the four raw-water pumps

(Continued on page 621)

The Number of Crossties Treated in 1941 Recorded a Gain of 11.7 Per Cent, As Compared to the Number Treated in 1940

Volume of Wood Treated Up More than 20 Per Cent in 1941

Responding both to increased industrial activity and to acceleration of the National Defense program, the volume of wood given preservative treatment in 1941 increased 20.22 per cent, compared with 1940, thus continuing at a higher rate the upward trend that wood preservation has been following since 1934, except for a slight reverse in 1938. The volume of wood treated in 1941 was the largest since 1930, and has been exceeded only four times in the 33 years complete records of preservative treatment have been compiled

IN 1941, wood preservation continued the upward trend which it has followed consistently since 1934, except for a slight recession in 1938. A total of 319,164,422 cu. ft. of wood was given preservative treatment in 1941, an increase of 53,691,273 cu. ft. or 20.22 per cent, over the quantity treated in 1940, according to figures compiled by R. K. Helphenstine, Jr., Forest Service, United States Department of Agriculture, in co-operation with the American Wood-Preservers' Association.

The volume of wood treated was 42,834,625 cu. ft., or 11.9 per cent, less than the quantity treated in 1929, the peak year for the industry. It is also of interest that this volume has been exceeded in only four of the 33 years that these statistics have been compiled.

For statistical purposes the material treated year by year is divided into eight classes. In 1941, increases were reported in all of these classes and the quantities of piles, poles and miscellaneous material treated were greater than for any previous year.

As in all previous years since the beginning of the wood-preserving industry, the railways maintained their position as the principal consumer of treated timbers. Previous to 1939, this position had been assured by the fact that crossties constituted more than 50 per cent of the total volume of timber treated, and only the railways use ties. However, in 1939 and succeeding years, including 1941, crossties fell below 50 per cent of the total volume of wood treated, despite relatively large increases in the number of ties treated, indicating that the increases in other classifications aggregated more than the increases in the number of ties treated. When switch ties, piles, poles, timbers, etc., are added, the railways consumed more than two-thirds of the total volume of wood treated in 1941.

Crossties up 11.7 Per Cent

A total of 47,664,019 crossties were given preservative treatment in 1941, representing a total volume of 142,992,057 cu. ft. of wood, or 14,999,263 cu. ft. more than were treated in 1940. Numerically the increase was 4,997,421, or 11.7 per cent. As in 1940, oak ties ranked first in number with 22,661,801, or 47.5 of the total, compared with 42 per cent in 1940. Southern pine remained in second place with 9,150,783 crossties treated in 1941, compared with 10,088,434 in 1940, representing 19.2 per cent of the total number treated. Likewise, Douglas fir remained in third place with 4,392,656 crossties treated, or slightly more than 9 per cent of the total; and gum again ranked fourth with 3,567,531 ties treated, approximately 7.5 per cent of the total. Other woods treated for crosstie purposes included ponderosa pine, lodgepole pine, tamarack, maple, birch, elm, beech and hemlock in the order given, aggregating 14.37 per cent of the total, while 1,044,084 crossties, or 2.19 per cent, were of woods other than those named.

Of the total number of crossties treated last year, 28,958,844, or 60.75 per cent, were treated with straight creosote or with solutions of creosote and coal tar; 17,491,742 crossties, or 36.7 per cent, were impregnated with mixtures of creosote and petroleum; and 1,029,869, or 2.16 per cent, were treated with zinc chloride or chromated zinc chloride. All other preservaties accounted for only 0.39 per cent of the total number of crossties

given preservative treatment. All but 8,132 of the crossties reported in 1941 were given pressure treatment.

Of the total number of crossties treated in 1941, 27,450,340, or 57.6 per cent, were bored and adzed prior to treatment, compared with 64.3 per cent in 1940, with 63 per cent in 1939 and with 70.5 per cent in 1938; 4,621,088 were bored but not adzed; 844,556 were adzed but not bored; while 14,748,035, or 30.9 per cent, were neither adzed nor bored. In both 1939 and 1940, approximately 23 per cent and in 1938 only 21 per cent of the crossties treated were not adzed or bored.

A total of 142,277,936 ft. b.m. of switch ties were given preservative treatment in 1941, representing an increase of 35,968,197 ft. b.m., or 33.8 per cent, compared with 1940. Oak maintained first place as a material for switch ties with 76,526,760 ft. b.m. or 53.8 per cent of the total; southern pine stepped up to second place with 22,178,733 ft. b.m., or 15.6 per cent; while Douglas fir dropped to third place with 17,948,388 ft. b.m., or 12.6 per cent; and gum, in fourth place, accounted for 8,666,749 ft. b.m., or 6.1 per cent of the total switch ties treated in 1941. Maple, tamarack, beech, birch, lodgepole pine, elm, in the order named, and a few miscellaneous species made up the remaining 11.9 per cent.

Despite a very large increase in 1939, amounting to 70 per cent, and a substantial gain of 7 per cent in 1940, piles recorded a still further increase in 1941 of 8,744,661 lin. ft., or 37.8 per cent, to bring the total for the year to 31,899,563 lin. ft., the largest amount ever recorded. As in previous years, southern pine was far ahead of other species, with 24,312,368 lin. ft., or 76.2 per cent of the total. This compares with 84 per cent in 1940. Douglas fir, in second place, trailed with 7,134,744 lin. ft., or 22.4 per cent; while Norway pine rose to third place with only 197,834 lin. ft., or 0.6 per cent; and oak fell to fourth place with 186,299 lin. ft. or 0.5 per cent. The remainder, aggregating 68,313 lin. ft., consisted mainly of western red cedar and ponderosa pine. All of the piles reported, except 41,666 lin. ft., were treated by pressure processes, and creosote or creosote mixtures were used as the preservative for 99.5 per cent of the piles treated.

During 1941, the wood-preserving industry used 215,467,780 gal. of creosote, compared with 174,625,305 gal. used in 1940, an increase of 40,842,475 gal., or 23.4 per cent. It is of interest to note that the consumption of creosote in 1941 was greater than for any year since 1929, and that it was only 10,906,447 gal., or 4.8 per cent, less than for that year, which was the peak year for the wood-preserving industry and, furthermore, that it has been exceeded in only three years previously.

Mixtures of creosote and petroleum in 1941 consumed 32,388,706 gal. of petroleum compared with 31,386,909 gal. in 1940, an increase of 1,001,797 gal. This volume of petroleum was used in the preparation of 62,864,714 gal. of such mixtures, compared with 64,370,186 gal. in 1940, a decrease of 1,505,472 gal.

In 1941, the wood-preserving in-

Crossties (Number) Treated by Kinds of Woods and Kinds of Preservatives — 1941

Kind of wood	Creosote (1)	Creosote Petroleum (2)	Zinc Chloride (3)	Zinc-Meta-Arsenite	Wolman Salts	Miscellaneous preservatives	Total	Per cent of total
Oak	17,454,373	5,182,350	3,750	.....	7,200	14,128	22,661,801	47.54
Southern Pine	6,433,667	2,658,643	47,841	2,500	.....	8,132	9,150,783	19.20
Douglas fir	131,620	3,856,264	272,365	106,069	1,018	25,320	4,392,656	9.22
Gum	2,998,798	566,033	.....	.....	.....	2,700	3,567,531	7.48
Ponderosa pine	.....	1,472,372	.....	.....	.....	.....	1,472,372	3.09
Lodgepole pine	98,582	812,703	415,760	.....	.....	.....	1,327,045	2.78
Tamarack	24,476	1,132,349	121,241	.....	.....	3,000	1,281,066	2.69
Maple	361,847	614,343	184	.....	.....	5,000	981,374	2.06
Birch	134,295	471,186	.....	.....	.....	.....	605,481	1.27
Elm	280,874	231,697	.....	.....	.....	.....	512,571	1.08
Beech	178,568	274,747	.....	.....	.....	5,000	458,315	0.96
Hemlock	.....	37,212	168,728	.....	.....	3,000	208,940	0.44
All other	861,744	181,843	.....	.....	.....	497	1,044,084	2.19
Total	28,958,844	17,491,742	1,029,869	108,569	8,218	66,777	47,664,019	100.00
Per cent of total	60.75	36.70	2.16	0.23	0.02	0.14		

(1) Includes distillate coal tar creosote and solutions of creosote and coal tar.
(2) Includes various percentage mixtures of creosote and petroleum.
(3) Includes chromated zinc chloride.

Wood Preservation, 1909-1941
Together with Consumption of Creosote and Zinc Chloride

Year	Total material treated, cu. ft.	Number of crossties treated	Creosote used, gal.	Zinc chloride used, lb.*
1909	75,946,419	20,693,012	51,426,212	16,215,107
1910	100,074,144	26,155,677	63,266,271	16,802,532
1911	111,524,563	28,394,140	73,027,335	16,359,797
1912	125,931,056	32,394,336	83,666,490	20,751,711
1913	153,613,088	40,260,416	108,373,359	26,466,803
1914	159,582,639	43,846,987	88,764,050	27,212,259
1915	140,858,963	37,085,585	84,065,005	33,269,604
1916	150,522,982	37,469,368	96,079,844	26,746,577
1917	137,338,586	33,459,470	83,121,556	26,444,689
1918	122,612,890	30,609,209	56,834,248	31,101,111
1919	146,060,994	37,567,927	67,968,839	43,483,134
1920	173,309,505	44,987,532	70,606,419	49,717,929
1921	201,643,228	55,383,515	77,574,032	51,375,360
1922	166,620,347	41,316,474	87,736,071	29,868,639
1923	224,375,468	53,610,175	128,988,237	28,830,817
1924	268,583,235	62,632,710	158,519,810	33,208,675
1925	274,474,539	62,563,911	169,723,077	26,378,658
1926	289,322,079	62,654,538	188,274,743	24,777,020
1927	345,685,804	74,231,840	221,167,895	22,162,718
1928	335,920,379	70,114,405	222,825,927	23,524,340
1929	362,009,047	71,023,103	226,374,227	19,848,813
1930	332,318,577	63,267,107	213,904,421	13,921,894
1931	233,334,302	48,611,164	155,437,247	10,323,443
1932	157,418,589	35,045,483	105,671,264	7,669,126
1933	125,955,828	22,696,565	85,180,709	4,991,792
1934	155,105,723	28,459,587	119,049,604	3,222,721
1935	179,438,970	34,503,147	124,747,743	4,080,887
1936	222,463,994	37,952,129	154,712,999	4,127,886
1937	265,794,186	44,803,239	183,574,581	4,833,935
1938	244,221,442	44,598,678	166,183,891	4,829,590
1939	245,219,878	35,748,845	163,864,259	4,522,070
1940	265,473,149	42,666,598	174,625,305	5,180,896
1941	319,164,422	47,664,019	215,467,780	5,786,424

*Includes chromated zinc chloride.

Treatment of Miscellaneous Material — Ft. b. m.

	1941	1940	1939	1938
Lumber	281,006,886	234,133,962	186,429,495	116,640,856
Fence posts	28,061,805	17,926,013	13,819,213	14,206,465
Tie plugs	2,222,766	2,581,215	1,559,314	788,781
Crossing planks	1,360,584	724,506	None reported	807,684
Car number	220,668	None reported	48,204	None reported
Window sash*	5,920	416	.....	.....

*Window sash were reported as a separate for the first time in 1940.

dustry used 1,403,863 lb. of zinc chloride, or 183,863 lb. more than was used in 1940, while the consumption of chromated zinc chloride increased from 3,960,896 lb. in 1940 to 4,382,561 lb. in 1941.

The Neches River Bridge of the Kansas City Southern at Beaumont, Tex., Constructed in 1941, Has Deck Timbers Treated with Wolman Salts

A total of 1,656,014 lb. of Wolman salts was used in 1941, an increase of 593,966 lb., or 55.9 per cent, compared with 1940. The use of zinc-meta-arsenite increased 67,248 lb., from 201,547 lb. in 1940 to 268,795 lb., or by 33.7 per cent. The use of Celcure, which was segregated from miscellaneous salts for the first time last year, required 68,182 lb. more of this preservative, the total consumption for 1941 being 310,921 lb., compared with 242,739 lb. the previous year. For the remainder of the preservatives, 992,504 lb. were miscellaneous salts, 590,917 lb., or 122 per cent more than in the previous year; and liquid preservatives, which decreased 163,234 gal., or 43 per cent, to 136,074 gal.

Treating Plants

The number of treating plants in 1941 was 235, or 7 more than in 1940. Of these, 230 were in active operation, the largest number ever recorded. This was 7 more than in 1940 and 9 more than in 1938 and 1939, the previous record years. Only 1 new plant was constructed during the year, 3 were abandoned and 2 remained idle, all of these plants being of the non-pressure (open-tank) type. Of the total number of plants in existence, during the year, 187 were commercial plants that treat wood by contract or for sale; 23 were owned and operated by railways and 25 were owned by public utilities, mining companies, etc., to supply their own requirements.

Increases Capacity of Large Water Treating Plant

(Continued from page 618)

that the amount of sludge blown off is at all times proportional to the quantity of water (and the amount of chemicals) entering the treating tank. For removing the treated water from the tank, a perforated collector pipe is provided in each "deck" of the precipitator. The effluent from each of these collectors discharges through a shear gate into a weir box at the top of the tank, where the tannin is added. From the weir box the water flows through a discharge pipe directly into one of the two adjacent storage tanks. From this tank underground equalizer lines extend to the other storage tanks.

At the extreme bottom of the treating tank is the agitator which is driven through a vertical shaft by a motor supported on a steel truss at the top of the tank. By means of a four-speed drive, the rate of rotation of the agitator may be so adjusted as to give the speed that is best suited to the needs of the treating process at any given time. Thus, as required, the agitator may be rotated at the rate of one revolution in 35 sec., 53 sec., 69 sec., or 105 sec.

Dry Feeders Used

For housing the chemical feeding and proportioning equipment that was installed in connection with the conversion of the treating tank, a small addition was made to the existing chemical storage house which is located only a few feet from the tank. The equipment in this structure includes four dry feeders, one for each of the chemicals used. The dry feeders for lime and soda ash are each equipped with an extension hopper at the top and are charged from an elevated platform to which the chemicals are elevated by a hand-operated hoist. These hoppers are provided with wire-mesh screens for removing any foreign objects that may be present in the chemicals.

Beneath each of the dry-chemical feeder tanks is a mixing pot or dilution box into which the chemical falls as it is ejected from the feeder by the discharge mechanism, the latter being, in turn, actuated by the chemical proportioning system. This consists of a Bailey meter located in the raw-water line to the treating tank, which is adjusted to actuate the feeding devices in the chemical tanks each time 1,000 gal. of water passes into the treating tank. In each of the dilution boxes beneath the dry feeders, the chemical is mixed with softened water from the treating tank and is then pumped into a line to the treating tank by a small motor-operated pump, there being a separate pump and delivery line for each chemical.

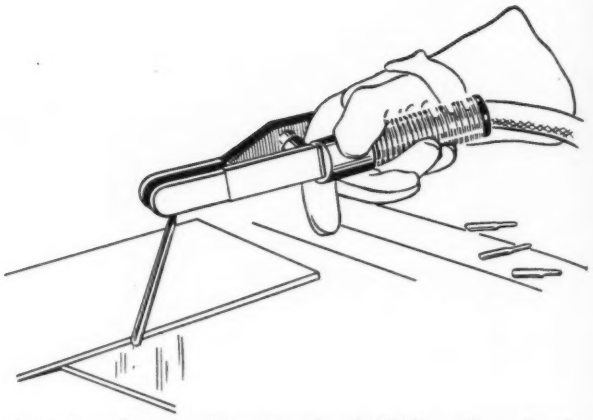
Also contained in the chemical house is the control panel for the four motor-operated pumps that supply the raw water. These pumps are controlled automatically by four mercury pressure-control switches located at different levels in one of the storage tanks. Colored lights on the control panel show which of the pumps are in operation.

Except that it was a considerably smaller undertaking, the conversion of the treating tank near the Pittsburgh passenger station was carried out along much the same lines as at McKees Rocks. The water treated at this plant is obtained from the Monongahela river and is delivered by two motor-operated pumps, each of which has a capacity of 200 gal. per min. The chemicals employed at this plant consist of lime, soda ash and sodium aluminate.

The undertaking involved in the conversion of the McKees Rocks and Pittsburgh treating plants was initiated under the general supervision of R. P. Forsberg, chief engineer of the P. & L. E. until his retirement on November 30, 1940, and was consummated under the direction of N. W. McCallum, now chief engineer. R. H. George, assistant engineer, was in direct charge of the project. All work connected with the conversion of the treating tanks and the installation of the chemical-proportioning and mixing equipment was performed under contract by The Permutit Company, New York.

Stop Wasting

Arc Welding Electrodes



Approximately 100 million Pounds of Welding Electrodes Are Wasted Each Year in This Country

CRITICAL scarcity of welding electrodes, if not the war effort of the country itself, demands that all waste of this material through carelessness or inefficiency be eliminated. Estimates, based on careful production studies, indicate that at least one-quarter of all welding electrode material is wasted, a situation which assumes appalling proportions when it is realized that more than 400 million pounds of electrodes are used in the country every year.

The critical scarcity of welding electrodes is due not alone to the scarcity of core material, which is made of steel or steel alloys, but also to a scarcity of the materials that go into the flux coating. Raw materials used in the manufacture of arc-welding electrodes include chromium, nickel, molybdenum, cellulose, titanium, oxides and aluminum. All of these materials are definitely scarce, making welding electrode conservation most important.

To help curb waste, the manufacturers of electrodes are making a concerted effort through bulletins and posters to warn users of wasteful practices and to promote the most efficient methods. Some of the good and wasteful practices pointed out in this literature are as follows:

Do Not Bend Electrodes

Wasteful—Do not bend an electrode unless necessary to get at a joint. Bend the rod close to the holder. To make the bend far from the holder is wasteful.

Good Practice—When possible use a straight welding electrode and melt it down to at least a 2-in. stub. On an average, three straight electrodes will do the work of four improperly bent electrodes.

Fit All Joints Properly Before Welding

Wasteful—Poor fit-up is the most insiduous waster of weld metal, especially in fillet welding. If the size of the fillet is not increased to compensate for poor fit-up, the joint will not develop full strength. If the size of the fillet is increased to compensate for poor fit-up, a great deal more time, power and electrode are required.

Good Practice—Electrode deposits in fillet welds will penetrate the corner of the plate as much as 3/32 in. Therefore, full throat size and strength can be produced when the gap in the fit-up is as much as 3/32 in. Larger gaps will require an excess of welding material.

Make Legs of Fillet Welds Equal

Wasteful—A long leg on an otherwise adequate fillet weld is unnecessary and wasteful, waste of as much as 30 per cent being possible. The shortest leg measures its size and strength.

Good Practice—Determine the proper size of fillet weld and then make the legs equal. By correct technic and procedure, full-size fillets having equal legs can be made faster and as easily as fillets having unequal legs.

Unequal legs result most frequently when making single-pass horizontal fillets. The cause may be any one of a combination of the following faulty conditions: Too much current; arc too long; electrodes too large; electrode held too near the vertical; forward travel speed too slow; wrong-type electrode; troublesome magnetic blow; longitudinal axis of joint more than 10 deg. from horizontal; etc.

Make Face of Fillet Welds Flat

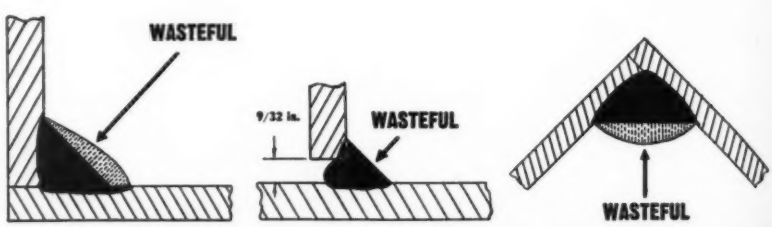
Wasteful—A fillet that is either excessively convex or concave across the face is wasteful. Excessive convexity in vertical fillets occurs most frequently. The cause may be any one or a combination of the following faulty conditions: Too much current; electrode too large; arc too short; travel speed too slow; and troublesome magnetic arc blow.

Good Practice—Good practice permits minor variations from a perfectly flat face, but a flat face with slight wash-up along both legs of equal length, is considered ideal.

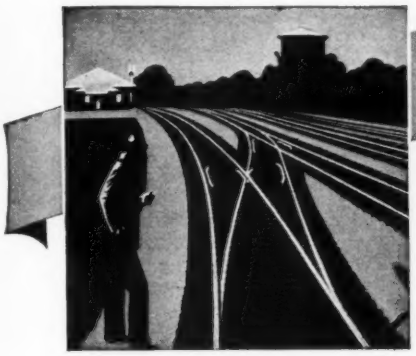
Keep Welding Electrodes Dry

Wasteful—Do not store or let welding electrodes stand in wet places, such as near sweating pipes. Do not open a new box until the contents of a box already open are used. If electrodes become wet accidentally, they should be dried out immediately.

Good Practice—Store electrodes in a dry place and above the floor level. Take only the minimum number of electrodes required into the field or shop for each job.



Wasteful Welding Practices—Left—One Leg of Weld Too Long. Center—Wasteful Gap at Point of Fit-Up. Right—Excessive Convexity in Weld Face



WHAT'S the Answer?

To Keep Equipment Working

In view of the difficulty of procuring repair materials, what special arrangements should now be made to care for current maintenance and forestall breakage or other failure of parts on equipment assigned to gangs engaged in laying rail, ballasting, etc.?

Is Getting Worse

By J. R. DERRICK
Manager Roadway Maintenance, Norfolk & Western, Roanoke, Va.

It is now practically impossible to obtain numerous repair parts from manufacturers; in some cases we have been advised that certain parts can no longer be furnished; and other parts cannot be obtained from the manufacturer unless the worn or broken part is exchanged for the new one. The situation is growing steadily worse and will, of course, continue to do so for the duration. It is the responsibility of every railway, therefore, to do everything possible to conserve the machinery and repair parts now on hand.

Machine operators have been accustomed for so long to have easy access to replacement parts that it is now expedient to educate them to the gravity of the present situation. A program should be developed to educate these men in the proper care and operation of their machines and to impress upon them the importance of conserving parts. The teaching of these men to operate their machines efficiently, with minimum wear and strain, and to keep all movable parts cleaned of dirt or grit, will be most beneficial to the effort to conserve parts and machines.

Material benefit can also be derived by assigning a competent mechanic to large rail and ballast gangs, with which a number of machines are used. He should be responsible for seeing that this equipment is cared for properly and is not abused in service. Daily inspections by this mechanic should insure repairs to various parts before they become worn beyond repair, through ignorance of their condition. He should also supervise the loading and unloading of the equipment, particularly to see that it is loaded correctly and is anchored securely. This effort can be furthered by using a single gang to lay rail on the entire railway. This will mean not only that a mechanic familiar with the condition of the equipment and with the job to be done will be with the force at all times, but that the operators will be much more familiar with the equipment and better trained in its use in this class of work.

In coaching operators in the handling of their machines, proper lubrication of the equipment should be stressed. Furthermore, if periodic checks are not already being made by supervising mechanics, they should be instituted immediately to insure that the correct oils and greases are kept on hand at all times and that they are being used as necessary; and to see that the oil is changed at regular intervals, as required for each type of machine.

It is my belief, based on observation that in the conservation of machines and their parts, more responsibility rests upon the machine repair men than on any other class of employees who perform work connected with the use of the machines.

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in November

1. *In view of the drain that military service and industry are making on the maintenance forces, is it now desirable to raise the age limit or relax the requirements for physical examinations, or both, for section and extra gang labor? To what extent? What are the disadvantages?*
2. *In view of the supply of bristles being shut off, what substitutes can be employed for paint brushes? To what extent are they satisfactory?*
3. *At present, when it is increasingly necessary to conserve steel for military uses, to what extent is it practical to straighten and reuse bent spikes in ordinary maintenance? When laying released rail? New rail? To reuse worn spikes?*
4. *What measures can be taken to conserve the life of wire rope?*
5. *In areas subject to possible air raids and disruption of traffic at several points simultaneously, is it desirable to decentralize material stocks and work equipment? To what extent? Are there any disadvantages?*
6. *In view of the present shortage of rubber, what other materials can be used for gaskets? What considerations are involved?*
7. *What advantages are there in standardizing tie plates for each width of rail base, for the duration of the war? After the war is over? Are there disadvantages?*
8. *What preparations should be made for blacking out buildings that must be occupied by night forces? Who should do this? Who should be responsible for making the blackout operative when the need arises?*

Their responsibility in this matter cannot be impressed upon them too forcibly, or that their periodical inspections of the machines should be made as frequently as possible. It is only by frequent inspections that the need for repairs can be detected in time to prevent parts wearing beyond repair before being discovered.

Breakdowns Inexcusable

By C. E. Miller
Assistant Engineer of Maintenance, Chicago & North Western, Chicago

Efficiency in the use of roadway machines, with the minimum of repair cost, is a live subject with all maintenance men in normal times and under favorable circumstances, but under the conditions that exist today it is inexcusable to incur breakdowns or to use any repair parts that can be avoided by diligent care and foresight. Most of the repair parts in use today are of special alloys that are much needed in the war effort, and any waste of such materials is not only expensive to the railway, but it reduces the supply available to our armed forces.

There is such a multiplicity of power machines and tools in the hands of the maintenance forces that the field for saving is very large and now, as never before, all of our men should realize, or be taught to realize, that it is their patriotic duty to conserve materials and obtain maximum efficiency from machines when much of the manpower of the country has been called into government service.

For these reasons, equipment inspectors should go over roadway machines as frequently as possible, talk to machine operators concerning the condition and operation of their machines, and see that they are adjusted correctly, cared for properly and handled efficiently. They should make any small field repairs which, if neglected, may result in serious breakdowns, with resultant disorganization of and delay to the gangs while the machines are out of service.

Much can be done to avoid such break-downs by providing proper lubrication, by keeping air cleaners in condition, by replacing or tightening loose bolts, by avoiding the racing of engines, by seeing that machines are blocked properly for shipment and by insuring that they are not damaged by undertaking work beyond their normal capacity.

When motor cars and other roadway machines are repaired in the field, old parts that are removed should be returned to the shop where many of them can be made serviceable by welding or where certain parts of the assembly can be recovered for use in similar assemblies. As an example, carburetors and magnetos may come into the shop with certain parts beyond repair, while other parts may be entirely satisfactory for use in accessories of the same type. Special bolts or screws may also be reused, or it may be gaskets, float valves, etc., that can be reclaimed, but whatever it may be, the shop forces should scrap no parts that can be restored to service. In carrying out the salvage of parts, it is entirely possible that in some cases the cost of doing so may exceed somewhat the cost of new parts, but at the same time it may avoid taking a machine out of service, and it will conserve vital material.

When using adzing machines, care should be exercised to lower the ballast and sweep off the ties, so that as little grit as practicable will be left to destroy the adzer bits, and broken spike stubs should be driven down. These bits are of a special alloy and when worn too short for further use, they should be returned to the manufacturer for credit and further use of the metal. Spikes that are badly throat-cut should be bent clear of the rail or withdrawn by claw bars, to avoid severe shock to the spike-pulling machines, which may break the lever jaws.

Drill bits should be kept sharpened, the speed of the drill should be regulated and cutting compound should be applied, so that the drill bit will not be damaged by burning. Clutches on power wrenches should be so adjusted that excessive bolt tension will be avoided, as this not only freezes the joints but throws undue stress on the machine. Tamping blades should be built up by welding before wear becomes excessive, and it is well to tip them with stellite to reduce the wear.

Machines of all kinds should be kept clean, not only for appearance, but to remove grease and abrasive elements. Grease is destructive to ignition cables and other parts in which rubber is used. When cleaning, loose bolts, small cracks or other defects that may lead to a breakdown may be discovered and can be corrected. Conservation should be extended to hand tools with the same solicitude as for machines.

All of the foregoing are routine matters during normal times, but the vital thing now is to get everyone to realize their importance at present when it is becoming so necessary to conserve materials of all kinds, particularly alloys of steel.

Saving Metal Roofs

How can a tin or galvanized-iron roof be patched without using either of these critical materials?

Is Confronting All of Us

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Making satisfactory repairs to a tin or a galvanized-iron roof is a problem that is confronting many supervisory officers today; those who are not facing this problem today are sure to meet it in the future, primarily because of the difficulty of obtaining the materials necessary to make repairs or replacements in kind. Obviously, there is a limit to the service life of the materials entering into building construction, but most of the mortality in metal roofs can be traced to lack of care in keeping the surfaces clean and well painted.

We have used roofing cements and asphalt coatings of various manufacturers for repairing metal roofs, but so far we have been unable to obtain more than temporary relief with respect to stopping leaks that have developed in such roofs. Some roofs of these types have been repaired and put in reasonably good condition by applying cotton fibres over the roof surface, but this material and its application are much more expensive than other preparations. Furthermore, because experienced workmen are required to apply it correctly, I do not recommend its use. In any event, it costs almost as much to apply the cotton fibre satisfactorily as it does to remove the metal and replace it with other material. I have in mind the renewal of the roof with asbestos shingles, from which a lifetime of service can be expected.

Recently, we renewed the roof of a warehouse having an area of 54 squares. The old roof was of tin shingles, which we had maintained for the last eight years by continued patching with other shingles, or by applying a roofing cement. The cost of maintenance was increasing to such an extent that it was no longer economical to maintain it in this manner. Therefore, the tin shingles were removed and sent in as scrap and as-

bestos shingles were applied to replace them, and we are certain that our worries with this roof are over. It is my belief that when a tin or galvanized roof is in need of frequent patching, part of it should be removed and replaced with other suitable material, and any serviceable material that is removed should be used to patch that part of the old roof that is left.

Cost Is Usually High

By General Building Inspector

It should be understood at the outset that if a metal roof has been allowed to deteriorate badly, any repairs that can be made will be only temporary in character and that the cost is usually relatively high. On the other hand, tin roofing cannot be obtained at present and galvanized roofing is all but unobtainable. The alternative is to make the repairs or replace the roof with other materials.

A practical method of patching a galvanized-iron or a tin roof is to clean and paint it with a good grade of oil paint. Then, while the paint is still wet, unbleached muslin, weighing 3½ to 4 oz. to the yard, should be laid over it without stretching the fabric. In fact, the cloth should be laid loosely and it is also desirable to allow considerable slack at points where there may be movement in expansion and contraction. As soon as the fabric is laid, it should be given a coat of paint, not waiting for the paint in which it is laid to dry. At this time the wrinkles resulting from the loose application should be brushed down flat. After the paint has dried thoroughly, a second coat should be applied.

Some roofers insist that the muslin be soaked in water for two or three days before it is applied and that it be applied wet—not wrung out—and that the first coat of paint be applied on the muslin before the cloth has had an opportunity to dry.

Spot Surfacing Track

What is the most effective method for spot surfacing track? Why?

There Is a Trick to It

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Any method that produces good surface with lasting results with the least work should be considered the most effective method for spot surfacing track. If passing traffic is employed for compacting the correct amount of good ballast between low or swinging ties and the undisturbed bed under them, then the job will be done quickly, effectively and with the least work. The trick or art of this kind of tamping is to get exactly the right amount of material in the cavity under each tie needing attention, for traffic to compact. When hand tamping bars were in general use, this was accomplished by working the material under the tie from both sides, next to both the inner and outer side of the rail, using the sharp end of the bar for small lifts and the tamping end for greater lifts. Care was exercised to disturb the ballast section the least possible amount.

Similar results can be obtained with tamping picks, but the ties must be raised higher from their beds and more care must be used to get the correct amount of ballast under each tie. Where much spotting is needed, power tamping equipment is justified. Experienced trackmen place the right amount of material under the ends of each tie with tamping trowels, but trowels are not as satisfactory or as fast as bars, picks or power tools, provided the latter are in the hands of experienced trackmen. Immediate results can be obtained by the trowel-tamping method. However, much-used tracks must be surfaced out of face as often as needed to correct small irregularities that cannot be cared for readily by spot surfacing.

Many Related Operations

By W. Woolsey
Section Foreman, Illinois Central, Chicago

To be effective, spot surfacing must be carried out in co-ordination with several other related operations, and it should be considered primarily as an intermediate process to keep track smooth during the intervals between general surfacings. Furthermore, to be most effective, the track must be equipped with clean ballast and sound ties.

With this thought in mind, assume that the track is being given a 2-in. raise out of face, that all ties needing renewal are being replaced, that all bolts are being tightened, preferably with a bolt tightener, and that the track is being gaged and lined. In general, a pick-up gang of the right size to keep pace with the surfacing gang should follow about two days behind it to pick up the weak places that may have developed. This gang should also correct irregularities that may have also developed in the line. From this time on, until the next general surfacing, all surfacing will be spot work.

About 10 days after the pick-up gang has completed its work, a small spot-surfacing gang, usually the section gang, preferably equipped with unit tie tampers, should go over the track again, picking up even the smallest low spots. Every bolt should be examined to insure that it is tight. The foreman should use his level constantly and should keep an eye on both rails for dips and low spots. He should follow this work with careful lining and, finally, with a complete and neat ballast dressing, including a neat ballast toe line. If the original surfacing and the follow-up work have been done carefully, the track should require minimum attention during the remainder of the year.

Likewise, during the following year the track should require only a small amount of routine work. However, every item that is likely to affect smooth riding should be watched carefully for in these days of high speeds small defects grow much more rapidly than formerly, and should be given quick attention. During the second year after the general surfacing, complete spot surfacing will be called for and a complete program of bolt tightening. The track level should be used to test every joint and rail as at the beginning. The gage should be corrected where necessary and the track should be lined more consistently than during the previous year. The principal feature this year will be the need to go over every foot of the track to insure that all low spots are cared for and that the line is as nearly perfect as it can be made. An occasional tie will need to be replaced, but renewals should not be heavy.

Track can be carried through the third year in the same way if the ties are sound, but better results will be obtained where it is given a general surface, raising it 1½ to 2 in., during the third year. If the general raise is deferred to the fourth year, the need for spot surfacing will be much more extensive than in the preceding years and it will not only be necessary to surface more track, but the individual raises will be greater, so that in the

long run it probably will cost no more to do the general surfacing at the three-year intervals. In any event, the method of spot surfacing which has been outlined should be repeated in the same cycle after each general raise. Surfacing will not bring satisfactory results unless it is accompanied by leveling, gaging, lining, tightening bolts and sound ties, so that each of these operations should be performed wherever needed.

Locks on Water Columns

Is it desirable to provide water columns with locks other than those installed by the manufacturer? Why? If so, what form of lock?

Slows Taking of Water

By Engineer of Water Service

Locking devices are applied to water columns for two purposes, the first of which is to prevent them from being blown across the track or turned enough by the wind to strike a passing train. I knew of this happening many years ago when the lock on a water column was broken and no one thought to anchor it so that it could not turn. Fortunately, in this case, no damage was done except to the column itself. However, the locking devices with which water columns are now equipped are adequate to hold them in place during all ordinary wind storms, and I can see no good purpose served by putting on additional locks. In the few cases I have known of where additional locking has been installed, it has interfered with the normal handling of water columns when taking water, and the locks did not prove to be of any particular safety benefit when the operation of these columns was compared with others not so equipped.

The second reason for additional locking is to prevent unauthorized persons from tampering with the columns and thus create a hazard to passing trains. Tampering of this kind may have occurred, but I have never heard of a case. In fact, except as a deliberate act of sabotage, I can scarcely conceive of this happening, and even here, in most cases, the eventual damage would scarcely be worth the risk and effort necessary to carry out such a project.

By No Means

By Supervisor of Water Service

As they are received from the manufacturer, water columns are equipped with automatic locking devices which are designed to prevent their rotation when not in use, but which allow them to be swung around when water is to be taken. These locks have been developed over a period of many years and in their present form represent the experience of many men with a wide variety of situations. They are positive and safe in their action, yet they do not hamper or interfere in any way with the use of the water columns.

I have been connected with water service work for more than 35 years and I believe that I have used, at one time or another, all of the makes of water columns on the market, and in all that time I have not seen a case in which the manufacturer's locking device did not operate adequately from the safety standpoint. On the other hand, some of these locks were not very satisfactory from the operating and maintenance standpoints, but most of the objectionable features have been corrected and today little criticism can be made of them.

If the locking equipment on the water columns, that is provided by the manufacturer, is maintained properly, there is no reason of which I am aware why additional locking should be necessary. It could only be a nuisance and in all probability would result in serious damage to the column. For these reasons, I take the position that by no means should water columns be equipped with locks other than those that are provided by the manufacturer.

What Should Be the Gage?

Should the wheels of light inspection and one-man motor cars be set to a wider gage then section and other gang cars? Why? If so, how much?

Influences Service Life

By G. R. Westcott
Assistant Engineer, Missouri Pacific, St. Louis, Mo.

Wheel gage on motor cars has considerable influence on both the service life of the wheels and the smooth-running qualities of the cars. Despite this, however, there are now on the market and in use on the railways, a variety of gages that give results in the spacing of the wheels varying as much as ½ in. While a greater uniformity in gaging is desirable, the fact that these different gages are used with moderate success leads to the thought that the actual gage is of less importance than that the front and rear wheels on the individual car shall be set to the same gage. Otherwise, there will be improper wheel alinement, and nosing and shimmying may be expected. Since, within reasonable limits, the actual gage is of less importance, there seems to be no good reason why more than one gage should be employed. It will be recognized that maintenance will be simplified if there is only one gage, as it will reduce the equipment the field maintainer must carry and obviate the possibility of setting wheels to the wrong gage.

The argument that the gage on small cars should be wider than on gang cars is usually that, because of their shorter wheel base and lighter weight, it is necessary to prevent shimmying. It is true that small cars, especially those with small wheels, will shimmy at lower speeds than large cars, if the general causes of rough riding, such as misalinement of wheels, worn wheel treads, unequal circumference of drive wheels or worn loose-wheel bushings, are present.

Oddly, however, the difference in wheel base between section cars and small cars is much less than is generally supposed. Comparing the usual wheel base of 37 in. for section cars, one manufacturer uses a wheel base of 32 in. on one-man cars; another uses 35 in.; and two others make these cars with a 37-in. wheel base. One manufacturer makes light-inspection cars with a wheel base of 35 in.; a second employs 36 in.; and two others make the wheel base 37 in. The same argument would indicate the gage should be reduced on heavy-duty gang cars, the wheel bases of which are materially greater than on section cars.

If the conditions favoring shimmying are present, the rough riding will

be more pronounced on the lighter cars, but the remedy will usually be found not in widening the gage but in correcting other defects.

Obviously, the gage chosen should not be too wide, for it is simpler for the field maintainer to widen the gage than to reduce it. Where differential axles are used and all wheels are insulated, some reduction of gage can be made by compressing the insulation. It is simpler to widen gage by introducing a paper shim in the insulation and this permits a larger change to be made.

The wheel gage recommended by the A.R.E.A. is 55 11/16 in., or 13/16 in. less than the standard track gage, measured 5/8 in. below the top of rail. Where the rail is laid to a gage less than 56½ in., as some roads are now doing in an experimental way, or where the rail has a bead of flowed metal near the top on the gage side, the effective lateral distance may be reduced to less than 13/16 in. While the standard is designed to take care of such conditions, a slight narrowing of the gage may be required under extreme conditions.

Cites A.R.E.A. Standard

By C. H. Ordas
Supervisor of Motor Cars, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Because of their shorter wheel base, the lighter cars exhibit a tendency to sway laterally at high speeds, particularly if they are equipped with wheels having treads with a taper of less than 1 in 50. Other conditions may cause this swaying, such as the mounting of wheels of different diameters, particularly on the drive axle, usually done when a worn or defective wheel is replaced by a new wheel. Again, if the frame is sprung, the axles may not be parallel. Ordinarily, when a car is operated at speeds permitted by the rules, the swaying of the car is not objectionable, but becomes more intensive if the speed is increased beyond prescribed limits.

The A.R.E.A. recommends a gage of 55 11/16 in., with the maximum 55 13/16 in., for all motor cars, which should cover the requirements under proper operating conditions. However, if a wider gage is permitted, it should be governed by the type of flange, that is, whether full-rolled or beaded. The gage of the wheels should not be such that when passing through a turnout, the wheel will not pull the opposite wheel away from the frog point. This applies especially to spring-rail frogs that are not fully closed. Again, the gage should be such that it will not cut the flange throat at points where the track gage may be tight or where the rail has flowed on the gage side.

Wheels with sharp flanges should be changed, as they create a hazard of derailment, especially on cars upon which a gage wider than the standard is permitted, and more particularly with the beaded flange. When a wheel on a drive axle is replaced and the opposite wheel is worn considerably, it is advisable to change both wheels to insure that the wheels on that axle will be of the same diameter.

Before Applying Insulation

What preparatory work should be done in advance of insulating an existing building? Why? What precautions, if any, should be taken?

Stop Heat Leakage

By General Inspector of Buildings

Heat losses in a building that is not insulated occur by reason of radiation, direct transfer, that is, conduction, and infiltration. It is generally agreed that the losses through the walls, floor and roof by reason of filtration range from 40 to 60 per cent; the losses through cracks and crevices range from 15 to 30 per cent; and these through windows and doors from 20 to 30 per cent. The insulation, if of good quality and properly applied, will retard the losses that occur by reason of radiation and conduction, but independent measures must be taken to prevent infiltration or most of the benefits that could otherwise be derived from the insulation will be lost. Again, little benefit will be gained by insulating only a part of the exposed surfaces, say the walls, the ceiling or the floor, even where infiltration through these surfaces is stopped, if nothing is done about other infiltration.

Roofs and roofing should be put in first-class condition to insure against leaks, for moisture not only interferes with the functioning of the insulation, but damp insulation does not dry out readily and thus induces decay in the surrounding wood. Furthermore, a tight roof tends to impede filtration into the attac space and thus retards the flow of heat through the ceiling and roof.

It is my observation that most railway buildings, and this applies more particularly to the older ones, were constructed with no thought of heat conservation. For this reason, leakage through walls that are not tight, through crevices around door and window frames as well as between the sash and the frames, and through cracks in floors and ceilings, are very high, far exceeding those of radiation and conduction. No matter, therefore, what type of insulation is to be used, it will be necessary to correct these defects by eliminating this leakage, if benefits commensurate with the expenditure for the insulation are to be obtained.

It will also be worth while to apply weather strips on both doors and windows; in fact, this will be necessary if the installation includes air conditioning. Windows should be equipped with storm sash, and storm vestibules will prevent the inrush of cold air when doors are opened. The rigid, reflective and flexible types of insulation cannot be applied to the walls of an existing frame building unless either the exterior siding or the interior wall surface is removed, for they must be applied directly to or between the studs. These types are, therefore, best suited for those jobs which require extensive repairs, in which the removal of one or both wall surfaces can be justified. On the other hand, any of these types can be applied to or between rafters and attic floor joists.

If the repairs are not extensive enough to warrant the removal of a wall surface, fill materials can be used, since they can be poured or blown into the spaces between the studs, the joists or the rafters, until these spaces are filled completely. This type is also made up in the form of bats which can be laid between attic joists and in other spaces that may be open. Where this type is used, the same preparatory work to avoid filtration is necessary as with other types, but these materials can be forced into place through temporary openings in walls, floors or ceiling.

Must Be Weathertight

By Supervisor of Bridges and Buildings

It will be completely useless and a waste of good material to apply insulation to any building, and particularly to a frame structure, where it is generally needed most, unless the application is preceded by preparatory

work that will prevent leakage of heat from the building. Heat always flows from an object of higher temperature to one of lower temperature. The rate of this flow depends upon two factors, the difference in temperature of the two objects and the ability of the substances of which they are made, or of intervening substances, to transfer heat. This latter quality is known as conductivity and is measured by the coefficient of heat transfer, which is designated as K.

It is the function of insulation to reduce the heat losses in a building by retarding the flow of heat from the interior to the outside atmosphere. Knowing the value of K for the material under consideration, one can easily determine the thickness of the insulation necessary to reduce the flow of heat by the desired amount. The value of K has been worked out carefully for all of the insulating materials on the market. In a building that is not insulated there is not only a steady flow of heat from the interior to the colder atmosphere outside, but a large percentage of the heat is lost by reason of leakage of air through the walls, floor and roof of the structure. In many railway buildings, particularly those of frame construction, this form of loss is very high constituting in some cases as much as 75 per cent of the total.

It should be obvious, therefore, that it will be useless to apply insulation unless this source of heat loss is eliminated, and this must be done before the insulation is applied. The largest leakage in many buildings is around door and window frames and between the sash and the window frame. The latter can be cared for to best advantage with weather strips and storm windows. Cracks and crevices in walls and ceilings should be closed and it is particularly desirable to stop the leakage that occurs at the junction of the floor joists with sills, generally a point of severe leakage.

Transposing Rail on Curves

When transposing rail on curves, should the wear on the outer or the inner rail govern the time for making the transposition. Why? How is the limit of this wear determined?

Outer Rail Governs

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

The wear on the outer rail governs the time for transposing rail on curves. When the contour of the gage side of the head of the outer rail coincides with the average contour of passing wheels, the rail will wear rapidly under all conditions of weather, and extremely fast during dry hot weather. Besides this unduly rapid wear, an element that tends to cause derailments should be guarded against. When the rail contour is such that the average wheel flange fits the worn rails, the lead wheel of the rear truck of a car is prone to bite into the rail and climb over it where there are slight irregularities in line, surface or gage. Furthermore, flanges worn until they are vertical will ride up on these worn rails about ¾ in. from the top, causing the tread to raise as much as ¼ in. above the top of the rail, and this may cause chipped and broken flanges. For these reasons, the rail on curves should be transposed or the outer rail replaced before its contour approximates that of the wheels.

If the outer rail is transposed to become the inner rail before it receives too much wear, it will last from 1½ to 2 times as long in its new position as a new rail. If it is allowed to wear until it becomes too thin, however, the head may corrugate and become troublesome.

Wear on Low Rail

By L. J. Drumeller
Engineer of Track, Chesapeake & Ohio, Richmond, Va.

The time for transposing rail on curves depends on which rail is wearing most rapidly. With the advent of curve lubrication for the outside rail and heavier wheel loads in the slower-moving freight trains, in most cases wear appears first on the low or inside rail. It occurs in the form of mashing or corrugations on the top of the rail and, if the rail is allowed to remain in the track for any length of time after the mashing first becomes apparent, the rail will not be fit for transposing, as this form of wear progresses rapidly.

Flange-worn rail occurs on the outside or high rail, and is caused by the grinding action of the wheel flanges against the gage side of the head. Usually, this type of wear can be run much longer than the wear on the low rail, and yet allow the rail to be transposed. The limit of wear is usually determined by observation and past experience within a given territory. My suggestion is to transpose the rail immediately after the low rail begins to mash, thus securing the benefit of the cold rolling that the high rail has received. It has been my experience that rail transposed from the high to the low side lasts as long as new rail on the low side, owing to the cold-rolling effect from traffic.

Head Checks May Determine

By A. E. Perlman
Chief Engineer, Denver & Rio Grande Western, Denver, Colo.

The basis of transposing rail on curves must be controlled by fixing the limits of wear, and this is dependent on a number of variables, namely, the section modulus, the use of curve lubrication, the rate of curvature, the speed of trains, the superelevation and the type of rail. This limitation usually can be determined for a particular curve by the use of profile-measuring equipment at specified periods.

In mountain sections, on heavy grades and sharp curvature, where head checks develop on the low rail in from 12 to 14 months after it is laid, the limit-of-wear factor does not enter into the question of transposition. Usually, where these head checks are first discovered on the gage side of the low rail, it is necessary to transpose it, putting the gage side of this rail over to the gage side of the high rail to grind out these cracks and save the rail from breaking.

Sometimes the limit of wear for the high rail on a curve has been set as the time when the wear reaches the outside edge of the top of the joint bar. With curve oilers, this wear may be controlled to such a limit that the low rail will wear to such an extent that by the time it is reached this rail must be scrapped. Again, in some cases where alloy steels, such as intermediate manganese, are used, the limit of wear for both low and high rails will have to be determined by profile readings before any standard can be specified.

The limiting factors for determining the time for transposition then depend upon particular conditions on the individual road at particular locations. In general, a figure for the amount of abrasion from the head, both top and flange for low and high

rails, for transposing is about 20 per cent of the area of the head for number one relay or transposed rail. The correct percentage is determined by profile readings, after which gages can be made for various rail sections.

Depends on Many Factors

By W. E. Folks

Track Supervisor, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati, Ohio

This question has many ramifications, for the limit of wear may be applied to either the high or low rail while the rate and amount will depend on the degree of curve, the speed of trains and the wheel loads carried. In most cases, traffic conditions determine whether the high or the low rail will become the limiting factor for making the transposition. For example, assume a line having a speed restriction of 30 m.p.h., which carries a large tonnage of freight, with heavily loaded cars. In this case the wear on the low rail will govern the time when the rail should be transposed. In the same territory, with the same speed restriction, if the loads are light, the wear on the high rail will govern the time in which transposition will be required.

Should Be Standard

By Supervisor of Track

This is a question that is left to the individual judgment of the local officers on most roads, but I believe that there would be an advantage in establishing a standard for the limit of wear. In my experience, the condition of the low rail is the limiting factor with respect to when the transposition should be made. I am in a territory where rail on curves is either replaced or transposed as frequently as twice a year. We have found that if the low rail is watched closely and the rails are transposed without turning, as soon as the low rail shows wear all the way across the head, we get double the wear that we do from a new rail laid on the high side and allowed to remain until it must be replaced.

If the transposition is made in the way and at the time suggested, a second transposition can be made when the outer rail is worn to the point where it must be regaged, and wear equal to that following the first transposition will be obtained. In this case, the high rail is not turned, but the low rail is. If 100 is taken as the annual cost of the rail, the first transposition will reduce this to 54, while the second one will make it as low as 30, including the cost of transposing. This is less than one-third the cost where the rail is laid new, worn out and replaced, including the labor of laying and of disposing of the old rail.

Timber for Bulkheads

Is second-hand timber suitable for bulkheads at the ends of timber trestles? If not, why? If so, what are the advantages and under what conditions should it be used?

Use Only Sound Material

By Julius M. Bischoff

Office Engineer, Terminal Railroad Association, St. Louis, Mo.

Only sound, well-seasoned creosoted timbers should be used for bulkheads at the ends of timber trestles, to hold the embankment, to prevent settlement of the roadbed and obviate any disturbance of the compacted embankment by reason of replacement of the bulkhead. It is undesirable as well as uneconomical to use second-hand timber for such bulkheads, the exception being when other material is not available. The transition from embankment to a trestle causes poor riding on trains, which can be alleviated by a hard, compact and undisturbed embankment behind the bulkheads.

Uses New Treated Timber

By L. G. Byrd

Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Until a comparatively short time ago, we followed the practice of constructing bulkheads at the ends of all timber bridges from second-hand stringers released when bridges were renewed. This was a consistent practice until we began to use treated timber for the other elements of these structures, at which time we began to use treated material for the bulkheads. Yet we still use untreated second-hand timber for the renewal of bulkheads where a bridge of treated or untreated material is approaching the end of its service life.

These bulkheads are generally constructed of either treated or untreated second-hand ties that are not suitable for supporting the track. Whether the material we used is treated or untreated, depends on the condition of the remainder of the structure. If the trestle is virtually at the end of its service life and the bulkhead must be renewed, it would not be economical to use either new or second-hand treated timber for the bulkheads. We bolt the ties to furring strips and build them up to form the bulkheads, in the same shape and dimensions as required by the standard plan.

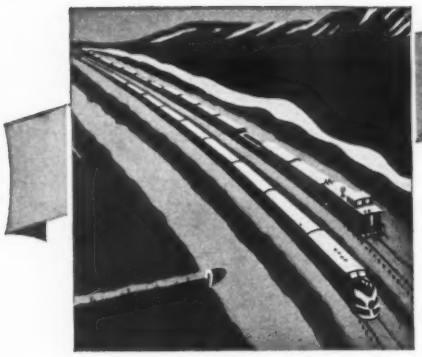
I do not consider it economical to use new material, either treated or untreated, at the ends of bridges that must be replaced in six years or less. The second-hand stringers that were used formerly are now being salvaged for reuse as stringers or for reworking into other dimensions that are needed to carry out repairs to other bridges and to buildings.

Only for Repairs

By General Inspector of Bridges

Only new treated timber should be used as bulkhead material for new trestles, except where it is practical to send released stringers to the treating plant for additional treatment. In this event, only sound material should be sent and only those stringers should be selected for this purpose, which are not suitable for use in repairing other trestles that are approaching the end of their service life. Obviously, it would be absurd to use untreated material or second-hand treated material that has a life expectancy no longer that that of untreated timber, in a new structure that will last for 30 to 40 years.

Just as obviously, it would be equally absurd to use new treated material for replacing an old bulkhead in a structure that may not last longer than six or seven years. There is no consistency either in using new untreated material for this purpose, unless nothing else is available; but this is a situation that occurs so seldom that it is scarcely worth discussion. Second-hand untreated material suitable for replacing bulkhead timbers is rare today because treated material has now been used long enough and extensively enough on our lines to have given an opportunity to utilize all of the released untreated material that has been fit for further use.



NEWS of the Month

Maintenance Expenditures Up

Maintenance of way and structures expenditures in May, 1942, were $66,162,657, the highest for any May since 1930; they compared with $51,640,349 in May, 1941, a rise of 28.1 per cent. During the first five months of 1942, maintenance of way and structures expenditures were $280,407,162, the highest for any like period since 1930, and a gain of 32.8 per cent over the corresponding total of $211,130,031 in 1941.

Ten Track Men Killed by Passenger Train

A section foreman and nine negro section laborers of a 16-man track gang were killed about 1½ miles west of Warrenton, Mo., on August 4 by the second section of the eastbound Pacific Coast Limited, Wabash passenger train en route to St. Louis. The section gang was reported to have been surfacing track with pneumatic power tampers near the east end of a curve and apparently the noise of the equipment prevented the men from hearing the train.

New Wage Minimum Approved

The Administrator of the Wage and Hour division of the U.S. Department of Labor has approved a recommended minimum wage rate of 40 cents an hour to apply on all railroads in the United States, effective August 31. This minimum was recommended earlier this year by an industry committee appointed under the Fair Labor Standards Act. No opposition was offered by the railroads to the proposal. About 20,000 laborers, principally on roads not subject to the general wage agreement of last December, will receive increases as a result of the new minimum wage rate.

Railroad Capacity Will Eventually Limit War Production

With the statement that "Railroad traffic, and not scarce materials, or fabricating capacity, or industrial manpower, will be the limiting factor which will restrict the expansion of our production of munitions" an article in the current issue of the Business Bulletin of the Cleveland Trust Company begins a comparison of the steadily growing volume of freight traffic to the railroad equipment position. Because this publication expresses the views of Brigadier General Leonard P. Aynes, vice-president of the trust company and an economist with a reputation for foresight, its articles attract wide attention in business quarters.

"It might naturally be supposed that the limiting factor in the munitions part of our war program would be shortages of materials, and the importance of these factors is emphasized just now by the widespread reports that we cannot produce enough steel to meet our war needs. These assumed material shortages are more nearly the products of miscalculation and misallocation than they are of lack of materials.

"Our railroads are doing an outstandingly good job of war-time transportation. Probably they can just about succeed in carrying the peak volumes of autumn freight in September and October without any serious car shortages.—The limits of their capacity have been nearly reached, and when they are reached the volume of our industrial output will have to level off, no matter what other forms of transportation may be called into service, and no matter how large the war appropriations may be."

Moving Troops a Bigger Job Than in World War I

The transportation of our armed forces and their equipment is a much bigger job today than in the first World War, according to Colonel E. C. R. Lasher, deputy chief of the Traffic Control division of the Army Transportation Corps, in a round-table radio discussion at Washington, D.C., on August 21, who further explained, "This is because it takes more than half again as much materials and supplies of all sorts to keep a fighting man in the field. This is much more of a mechanized war than the last one. It takes lots of transportation to provide all those trucks and tanks and jeeps and planes that we didn't have the last time, and to keep them supplied and running and flying.

"Every change that has been made since then has increased the transportation load. A division uses more guns than it did then, and each gun fires more rounds per minute and there is more weight in each round. All that calls for more transportation. And this is a long-range war, fought all over the world, thousands of miles from home."

WPB Requisitions 1,000 Miles of Track

Nearly 1,000 miles of abandoned and non-essential railroad track, including rails, switches, fastenings, and other track equipment have been taken over for war use during the last six months by exercise of the requisitioning authority of the War Production Board, the Inventory and Requisitioning Branch of this board announced on July 23.

Including sidings, suprs and miscellaneous track-side equipment taken over, the WPB declares that it is probable that approximately 200,000 tons of iron and steel products were made available for strategic purposes.

Rails, switches and fastenings in usable condition serve to provide new trackage and repair material in and around arsenals, docks, ammunition depots and, in some cases, transportation to new camp sites, it was pointed out. Rail which requires treatment before it can be used again for its primary purpose is shipped to rolling mills for reprocessing, while material which cannot be used in its existing form finds its way into the war effort as scrap metal.

Adopt Simplified Design for Tie Plates

The Association of American Railroads has adopted emergency provisions, approved by the American Railway Engineering Association, to be effective for the duration of the war, which modify the designs for tie plates for 112-lb. and 131-lb. rail and which supersede the designs for tie plates that appear in the A.R.E.A. manual.

The new designs provide for two sizes of plates, 7¾ in. by 13 in. and 7¾ in. by 11 in., for 112-lb. rail and two sizes, 7¾ in. by 14 in. and 7¾ in. by 12 in., for 131-lb. rail, for a cant of approximately 1 in 40, eccentricity of ⅜ in., double shoulders, a flat rail seat and a flat bottom, shoulder extensions with sloping top surfaces and the thickness under the outside shoulder to be 1/5 of the length of the outside shoulder extension to the next larger 1/32 in.

The emergency provisions further provide that: "As manufacturers have equipment for producing a number of tie plate sections for use with each of the various rails, it would be wasteful not to use existing equipment during the present emergency. If production were confined to a single tie plate section for each rail, some manufacturers would require additional equipment to produce the one section in sufficient quantity. When existing equipment for the production of tie plates for 112-lb. and 131-lb. rail is no longer available, or the production of a specific design of tie plate for either of these rail sections would interfere with the war effort, tie plates of the new simplified design shall be provided."

These emergency provisions, dated July

24, and drawings of the four simplified designs of tie plates have been published in a pamphlet which is being mailed to all member roads of the A.A.R.

To Improve Rail Route for Ore from Superior

Development of an additional route for bringing iron ore from the Great Lakes region to the steel mills has been approved by the War Production Board. The program would involve the construction of ore yards and docks at Escanaba, Mich., and the possible dredging of additional channels in Escanaba harbor, in order "to make possible the handling at that port of 60,000,000 tons of ore per season." Also comprehended in the project are improvements in roadbed and bridges of rail lines, operating between Escanaba and Superior, Wis., and between Escanaba and Ironwood, Mich.

The WPB announcement said that the plan was a move "to safeguard the flow of iron ore to the nation's iron and steel mills . . . in the event the locks at Sault Ste. Marie, Mich., should be closed to traffic of ore-carrying vessels." It was stated that approximately 84,000,000 tons of ore will pass through the Soo locks this season, adding that "to move this ore by rail to the steel-producing areas around the lower lakes would be extremely expensive and would tie up rail shipments of other goods." Moreover, "it would require rail equipment urgently needed for other purposes."

Negro Track Man Derailed Panama Limited

An Illinois Central track man has confessed to the Federal Bureau of Investigation that he tampered with the track near Kerrville, Tenn., on July 13, causing the derailment of the Panama Limited, a streamlined Illinois Central train. The criminal, James Edward Payne, a 32-year-old Illinois Central negro track laborer, admitted that he pulled the inside spikes on 14 ties, removed one pair of angle bars and moved one end of the rail inward in much the same manner that vandals caused the wreck of the City of San Francisco three years ago. Originally, when taken into custody by the FBI several weeks ago, Payne admitted tampering with the track in an attempt to wreck the streamliner, but told a wild story of being forced to commit the crime by a white man with a gun. He subsequently admitted, however, that no other person was involved and that he intended to rob the train. He told the FBI that no grievance against the Illinois Central was involved. He had been working for the railway about three weeks prior to the derailment and had previously worked in an Illinois Central track gang in 1927 and 1928. He had no previous criminal record and has always worked as a farmer or laborer near Kerrville.

In committing the crime, Payne had secured a pinch bar which had been left near a spur track switch and had been used as a make-shift switch lever. He hid the pinch bar on the right of way near the track at night several days before he attempted to wreck the streamliner. The same night, he broke into a cotton gin and stole a big wrench and hid it near the track. These were the only tools used.

Association News

Maintenance of Way Club of Chicago

In the interest of programming the most helpful meetings in the history of the club, the Executive committee met in Chicago on August 28, to formulate plans for the coming season. Arrangements have been made to continue to meet in the Ambassador room of Huyler's restaurant in the Straus building, 310 So. Michigan avenue, and the first fall meeting will be on October 26.

Bridge and Building Association

Plans are rapidly approaching completion for a highly constructive program for the forty-ninth annual meeting which will be held at the Hotel Sherman, Chicago, on October 20-22. The program is being keyed to the critical problems now confronting bridge, building and water service officers and will include addresses by a number of men prominent in the railways' war effort.

Bridge and Building Supply Men's Association

At a meeting of the Executive Committee on August 28, it was decided to abandon plans for an exhibit coincident with the meeting of the American Railway Bridge and Building Association at Chicago on October 20-22. This action was taken in view of the pressure under which many of the member companies are working in filling orders for war materials.

Track Supply Association

Forty-three exhibitors have now arranged to take 61 spaces for the display of their products at the Hotel Sherman, Chicago, on September 14-17, coincident with the fifty-seventh annual meeting of the Roadmasters' and Maintenance of Way Association, promising a most constructive exhibit at a time when railway maintenance men are looking to railway supply men for more than ordinary help. In addition to the companies already reported as planning to exhibit, three other companies—The Eagle Grinding Wheel Company, Chicago; Geo. M. Hogan Company, Chicago; and Power Ballaster Company, Chicago, will exhibit.

American Railway Engineering Association

At a meeting of the Board of Direction in Chicago on August 18, A. A. Miller, chief engineer maintenance of way, Missouri Pacific, and a director of the association, was elected junior vice-president, an election occasioned by the death of Vice-President W. F. Cummings, chief engineer of the Boston & Maine, on April 9, which automatically advanced F. R. Layng to senior vice-president.

Among other action taken, the Board passed upon the budget requests to be submitted to the Association of American Railroads for appropriations for research and other work to be carried out during 1943. The General committee of the Engineering division considered these requests at a meeting in Chicago on the following day and recommended their approval.

Only one standing committee held a meeting during August, this being the Committee on Buildings, at Cincinnati, Ohio, on August 4. However, the Emergency committee of the association on Roadway and Track Problems met at Chicago on August 20, to consider the simplification of joint bar design.

Six other committees plan meetings during September, all to be held in Chicago, concurrent with the Roadmasters' meeting to afford members of the committees an opportunity to attend sessions of the meeting and to visit the exhibit of the Track Supply Association, to be held in conjunction therewith. The committees which are to meet in September include the following: Water Service, Fire Protection and Sanitation, on September 15; Economics of Railway Labor, on September 15; Roadway, on September 15-16; Maintenance of Way Work Equipment, on September 15-16; Rail, on September 16; and Track, on September 16.

Roadmasters Association

All arrangements have been completed for the 57th annual meeting of the Roadmasters and Maintenance of Way Association which will be held at the Hotel Sherman, Chicago, on September 15-17. An unusually strong program has been developed which will give primary consideration to the problems that are arising in the maintenance of roadway and track as a part of the railways' war effort. Special attention will be given to means for overcoming the wear and tear of the present record traffic in the days of increasing shortages of labor and materials. Speakers will include officers of the U. S. Army, the War Production Board, the Office of Defense Transportation, the Association of American Railroads and the Western Association of Railway Executives, in addition to executives of individual railroads. The program is as follows:

Tuesday, September 15
Morning Session—10:00 A. M.

Meeting called to order.

Invocation by Dr. Howard A. Vernon, Pastor, Englewood Baptist Church, Chicago.

Address on "Our Job Today," by C. E. Johnston, chairman of the Western Association of Railway Executives and associate director, Western Region, of the Office of Defense Transportation.

Greetings from the American Railway Engineering Association, H. R. Clarke (chief engineer maintenance of way, C. B. & Q.) president.

Greetings from the American Railway Bridge and Building Association, R. E. Dove (assistant engineer, C. M. St. P. & P.), president.

Greetings from the Track Supply Association, Ross Blackburn (The Buda Company), president.

Address by President A. B. Hillman (engineer maintenance of way, C. & W. I.-Belt Ry. of Chicago).

Appointment of Subjects, Resolutions, Auditing, and Nominating Committees.

Report of Committee on the Maintenance of Roadway Equipment; Ray Marshall,

chairman (district roadmaster, G. N., Superior, Wis.).

Afternoon Session—2:00 P. M.

Report of Committee on Recent Developments in Tamping Practices; A. B. Chaney, chairman (district engineer, Mo. Pac., Little Rock, Ark.).

Address on "The Use of Cars and Locomotives by Maintenance of Way Forces in These Days of Maximum Traffic Demands," by W. C. Kendall, chairman, Car Service division, A.A.R.

Adjourn at 4:00 p.m. to study the exhibit of materials and equipment presented by the Track Supply Association.

Tuesday Evening—8:00 P. M.

Address on "The Work of the Military Railway Service," by Brig. Gen. Carl R. Gray, Jr., general manager, Military Railway Service.

Wednesday, September 16

Morning Session—9:30 A. M.

Report of Committee on The Control of Injuries Under Today's Changing Conditions; S. J. Hale, chairman (assistant division superintendent, N. & W., Roanoke, Va.).

Address on "Our Track Labor Problem," by Otto S. Beyer, director, Division of Transport Personnel, Office of Defense Transportation.

Report of Committee on Extending the Life of Rail and Fastenings; J. B. Martin, chairman (general inspector of track, N. Y. C., Lines West of Buffalo, Cleveland, Ohio).

Afternoon Session—2:00 P. M.

Materials in a Time of Scarcity

Address on "The Outlook for Track Materials," by W. W. Kelly, director, Section of Materials and Equipment, Office of Defense Transportation, Washington, D. C.

Address on "Track Scrap—Its Importance in Our National Program," by B. C. Bertram, Director of Railway Salvage, War Production Board, Washington.

Address on "What One Railroad Found," by C. M. Chumley, engineer maintenance of way, I. C., Chicago.

Adjourn at 4:00 p.m. to study exhibit of materials and equipment presented by the Track Supply Association.

Wednesday Evening—6:30 P. M.

Annual Dinner given by Track Supply Association.

Thursday, September 17

Morning Session—9:30 A. M.

Report of Committee on Highway Crossing Maintenance and Construction; F. E. Schaumburg, chairman (roadmaster, C. & N. W., West Chicago, Ill.).

Address on "Our Responsibilities as Track Men in a Time of All-Out War," by F. R. Layng, chief engineer, B. & L. E., Greenville, Pa., and first vice-president of the A.R.E.A.

Report of Committee on the Use of Track Grinders; F. J. Herlehy, chairman (roadmaster, C. M. St. P. & P., Milwaukee, Wis.).

Afternoon Session—2:00 P. M.

Summing Up—A review of the constructive ideas developed during the convention, by Elmer T. Howson, Western Editor, *Railway Age*—Editor, *Railway Engineering and Maintenance*, Chicago.

Business Session:

Personal Mention

General

M. B. Oliver, roadmaster on the Charleston & Western Carolina at Augusta, Ga., has been promoted to assistant to the general superintendent, with the same headquarters.

William H. Jones, formerly roadmaster on the Atchison, Topeka & Santa Fe at Chillicothe, Ill., whose promotion to acting trainmaster at La Junta, Colo., was reported in the April issue, has been appointed trainmaster at La Junta.

Raymond L. Gebhardt, executive assistant to the trustee of the New York, Ontario & Western, and an engineer by training and experience, has been elected

Raymond L. Gebhardt

vice-president—operations, with headquarters as before at New York. Mr. Gebhardt was born at Easton, Pa., on September 9, 1882, and attended the Lafayette College of Civil Engineering. He entered railroad service on August 24, 1908, as a draftsman with the Lehigh Valley. In April, 1910, he was advanced to assistant engineer and on October 15, 1912, he was promoted to division engineer. On April 15, 1916, Mr. Gebhardt was appointed trainmaster and on July 23, 1918, he became division superintendent, serving on various divisions until July 1, 1941, when he left the Lehigh Valley to become executive assistant to the trustee of the New York, Ontario & Western, which position he held until his recent election as vice-president—operations.

Frederic R. Bartles, assistant general manager of the Lines west of Livingston, Mont., of the Northern Pacific, and an engineer by training and experience, has been promoted to general manager of the Lines west of Livingston, with headquarters as before at Seattle, Wash. Mr. Bartles was born at Williamsport, Pa., on February 28, 1875, and attended Lehigh University. He entered railway service in 1897 with the Pennsylvania and served with the New York Central & Hudson River (now New York Central) from 1899 to 1905 and with the Panama Canal Company from 1905 to 1907. On May 10, 1907, he went with the Northern Pacific as inspector in the division engineer's office at Brainerd, Minn., and on June 1, 1907, he was promoted to supervisor of bridges and buildings at Dilworth, Minn., later being transferred successively to Fargo, N. D., Buffalo, N. D., and back to Dilworth. On March 1, 1911, Mr. Bartles was advanced to trainmaster on the Pasco division and on January 1, 1914, he was promoted to superintendent of the Fargo division. He later served successively as superintendent of the Minnesota, Rocky Mountain and Seattle divisions. On December 15, 1931, Mr. Bartles was promoted to assistant general manager of the Eastern district, with headquarters at St. Paul, Minn., and on February 1, 1940, he was transferred to the Lines west of Livingston, with headquarters at Seattle, which position he held until his recent promotion, effective June 16.

William G. Choate, general manager of the Texas lines of the Missouri Pacific, with headquarters at Houston, Tex., and an engineer by training and experience, retired on August 1. Mr. Choate was born at Taunton, Mass., on November 28, 1865, and attended Peekskill Military Academy and Hobart College. He entered railway service in 1886 as a fireman on the Union Pacific, later serving as a brakeman and then becoming a rodman in the engineering department at Denver, Colo. Mr. Choate was later promoted to assistant engineer and then to roadmaster and in 1890 he went with the Rio Grande Junction (now part of the Denver & Rio Grande Western) as a construction engineer. A year later he was promoted to superintendent and in 1901 he went with the El Paso & Southwestern (now part of the Southern Pacific) as general manager in charge of construction and operation. He later served successively as superin-

William G. Choate

tendent of the Alexandria division of the Southern, superintendent of the Rio Grande Junction, general manager of the Oklahoma Central (now part of the Atchison, Topeka & Santa Fe), superintendent of the Louisiana division, of the Gulf Coast Lines, and assistant to the president, assistant general manager and general manager of the Gulf Coast Lines. In 1925, when the Missouri Pacific acquired the Gulf Coast Lines, Mr. Choate was

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Two TOOL STEELS CAN CUT AS CHEAPLY AS ONE

WHAT'S more important, two tool steels can cut twice as *fast* as one, and speed is the prime urgency in war production.

But there are ways of increasing production beside installing more modern types of machine tools. A better tool steel, or one better suited to an individual job, can materially speed up the work your existing equipment is capable of doing.

Take the case of a big Detroit plant, using DBL High Speed Tool Bits instead of a high-tungsten variety, machining castings of X-1340 steel with a surface hardness of 33 Rockwell C, and a subsurface hardness of 26-28C. The DBL Tool Bits showed 30% increase in work done between grinds, running at 166 RPM against a previous speed of 100 RPM.

Our Service Staff is ready to help you team up tool steels with your production jobs, for more work done per machine. They'll show you the best *alternate* steels, too, as a precaution in keeping the lines moving.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

appointed general manager of the Texas lines of the Missouri Pacific (including the International-Great Northern), which position he held until his retirement.

Engineering

W. H. Hobbs has been appointed engineering assistant to the chief executive officer of the Missouri Pacific, with headquarters at St. Louis, Mo.

F. K. Calkins has been appointed division engineer of the Denver & Salt Lake, with headquarters at Denver, Colo., a newly created position.

R. E. Patterson, regional engineer of the Lehigh Valley at Buffalo, N.Y., has been appointed acting chief engineer, construction-maintenance, with headquarters at Bethlehem, Pa.

R. O. Irwin, assistant industrial agent on the Atchison, Topeka & Santa Fe at San Francisco, Cal., has been appointed assistant to the chief engineer of the Denver & Rio Grande Western, a newly created position, with headquarters at Denver, Colo.

T. L. Pidcock, division engineer on the Union Pacific at Salt Lake City, Utah, has been appointed assistant division engineer at Cheyenne, Wyo. Mr. Pidcock was succeeded at Salt Lake City by **L. F. Racine,** as reported in the August issue.

Jack Stewart, whose promotion to assistant division engineer of the Rio Grande division of the Southern Pacific, with headquarters at El Paso, Tex., was reported in the July issue, was born at Denison, Iowa, on May 7, 1899, and entered railway service on March 10, 1919, as a levelman on the Southern Pacific at Dunsmuir, Cal., subsequently serving as transitman and assistant engineer. In October, 1930, Mr. Stewart was promoted to roadmaster at Alturas, Cal., and was subsequently transferred to various points on the Shasta, Tucson and Los Angeles divisions, being located at Los Angeles, Cal., at the time of his recent promotion.

John P. Scully, whose appointment as division engineer of the Portland division of the Maine Central, with headquarters at Portland, Me., was reported in the August issue, was born at Concord, N.H., on July 18, 1893, and entered the service of the Maine Central in June, 1913, as a rodman in the engineering department, later serving as a transitman and as assistant roadmaster of the Portland division. Subsequently he was promoted to roadmaster and served in this capacity successively on the Mountain and Rumford divisions. On January 15, 1935, Mr. Scully was appointed general agent at Lewiston, where he remained until his recent appointment.

Gilbert D. Mayor, whose promotion to assistant division engineer on the Chesapeake & Ohio, with headquarters at Huntington, W. Va., was reported in the August issue, was born on January 21, 1900, and obtained his higher education at Washington & Lee University, graduating in 1925 with a bachelor of science degree in civil engineering. He entered railway service on February 9, 1926, as an assistant signalman on the Chesapeake & Ohio. On April 3 of the same year, he became an instrumentman in the maintenance of way department, and on June 11, 1929, he was promoted to assistant cost engineer. On July 1 of the same year, Mr. Mayor was appointed supervisor of track, which position he held until his recent promotion.

Frank J. Meyer, assistant chief engineer of the New York, Ontario & Western at Middletown, N.Y., has been promoted to chief engineer, succeeding **W. C. Heidenthal,** who has been appointed engineering consultant to the trustee. Mr. Meyer was born in Brooklyn, N.Y., on August 18, 1884, and began his career as a rodman

Frank J. Meyer

for the Rapid Transit Subway Construction Company in the East River terminals. He entered railway service on February 1, 1906, in the engineering department of the New York, Ontario & Western, serving successively as chainman, rodman, levelman, transitman, chief of party, supervisor of track, roadmaster, engineer in charge of bridges, buildings, tunnels, docks, anthracite and bituminous coal storage, tie and timber inspection, grade crossing eliminations and general roadmaster. Mr. Meyer was appointed assistant chief engineer on May 1 of this year, holding this position at the time of his recent promotion. He has long been active in the Roadmasters' and Maintenance of Way Association and is a member of the executive committee.

Mr. Heidenthal was born at Port Jervis, N.Y., on August 27, 1878, and after experience in railroad location and construction, entered the engineering department of the New York Central on double tracking operations. In March, 1905, he joined the engineering department of the New York, Ontario & Western and served as assistant engineer. On March 4, 1907, he was appointed roadmaster in charge of maintenance and double tracking on the Scranton division and in September, 1916, he was promoted to engineer maintenance of way. He became chief engineer on April 4, 1937, which position he held until his recent appointment as engineering consultant to the trustee.

Belsur Bristow, whose promotion to engineer-roadmaster of the Burlington-Rock Island, with headquarters at Houston, Tex., was reported in the August issue, was born at Tipton, Ind., on May 22, 1900, and attended Oklahoma University from 1920 to 1924. He entered railway service on November 8, 1922, as a chainman on the Chicago, Rock Island & Pacific at El Reno, Okla., later serving in various positions in the engineering department until January, 1930, when he was promoted to assistant engineer at Dalhart, Tex., later being transferred to Little Rock, Ark. In January, 1933, he was appointed a track supervisor and served in that capacity and as acting roadmaster at various points, including El Dorado, Ark., and Little Rock. In November, 1939, Mr. Bristow was promoted to roadmaster at Chickasha, Okla., and in September, 1941, he was transferred to Ft. Worth, Tex., where he remained until his recent promotion.

Roland D. Pierson, whose promotion to regional engineer of the Coast lines of the Atchison, Topeka & Santa Fe, with headquarters at Los Angeles, Cal., and with special duties in connection with national defense and industrial projects, as reported in the August issue, was born at Augusta, Ill., on October 8, 1887, and studied electrical and civil engineering for two years at the University of Illinois. He entered railway service on April 26, 1910 as a chainman on the Santa Fe at Winslow, Ariz. In May of the same year he was promoted to rodman on construction on the Albuquerque division, and in August, 1911, he was appointed an inspector on road and trail construction in the Grand Canyon. From March, 1912, to November, 1915, he served as a rodman

Roland D. Pierson

on construction and maintenance on the Albuquerque division and at the end of this period he became connected with the Interstate Commerce Commission as a computer with a party on railway valuation. In April, 1916, he was appointed a transitman on construction on the Santa Fe, and in the following year he was made an assistant engineer on construction on the Arizona division. From December, 1917, to January, 1919, Mr. Pierson was in the U. S. Army, where he attained the rank of second lieutenant, returning to the Santa Fe at the end of this period as a transitman on the Coast lines. On January 1, 1921, he was advanced to assistant division engineer of the Arizona division with headquarters at Needles, Cal. On

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September 1, 1929, he was transferred to Fresno, Cal., and on May 1, 1934, he was transferred to San Francisco, Cal. Mr. Pierson was promoted to division engineer of the Albuquerque division, with headquarters at Winslow, on September 1, 1936, and on February 1, 1941, he was transferred to the Los Angeles division, with headquarters at San Bernardino, Cal., which position he held until his recent promotion, effective July 1.

Albert A. Colvin, whose promotion to division engineer on the Chicago & North Western, with headquarters at Norfolk, Neb., was reported in the July issue, was born at Wheaton, Ill., and studied civil

Albert A. Colvin

engineering at the University of Illinois from 1906 to 1909. He entered railway service in September, 1909, with the Pittsburgh, Cincinnati, Chicago & St. Louis (now part of the Pennsylvania), being engaged on track elevation work at Chicago, and in January, 1911, he went with the Chicago & North Western, where he served in the general manager's office until April, 1912, when he was assigned to track elevation work, with the title of assistant engineer. During a part of 1918, Mr. Colvin obtained a leave of absence and entered the employ of the government as a civilian member of the commanding officer's staff at the Scituate proving ground, Scituate, Mass., during the construction of that project. Since 1930, he has served as assistant supervisor of bridges and buildings, assistant roadmaster, assistant engineer and supervisor of bridges and buildings at various points.

I. D. Talmadge, roadmaster of the New York, Ontario & Western, has been promoted to district engineer, with headquarters as before at Middletown, N.Y. **H. H. Hann,** supervisor of safety, has been promoted to district engineer at Walton, N.Y. **F. L. Cagwin,** roadmaster at Childs, Pa., has been promoted to district engineer at Mayfield Yard, Pa. **E. J. DeWitt,** office engineer, has been promoted to engineer of bridges and buildings, with headquarters as before at Middletown, N.Y.

Mr. Talmadge was born on June 7, 1894, at Mountain Lake, N.Y., and is a graduate in civil engineering of the International Correspondence Schools. He entered the service of the N.Y.O. & W. on September 1, 1911, as a member of the engineering corps, becoming a pilot on roadway valuation in April, 1917. During the World War, Mr. Talmadge served with the U. S. Army as a second lieutenant, returning to the N.Y.O. & W. on July 1, 1919, as assistant roadmaster. On July 1, 1920, he was promoted to roadmaster, which position he held until February 1, 1940, when he was assigned to valuation work. On July 1, 1942, he was promoted to valuation engineer. His appointment as district engineer became effective on August 1.

Mr. Hann was born at Andover, N.Y., on February 20, 1892, and graduated in civil engineering from Bucknell university in 1916. He entered the service of the N.Y.O. & W. in the valuation department on August 1, 1916. In April, 1918, he entered the U.S. Army, being commissioned a lieutenant of engineers while serving in France. Mr. Hann returned to the railroad in October, 1919, and was appointed assistant roadmaster at Walton, N.Y., in November, 1920. Two years later he became assistant supervisor of track, and in June, 1926, he was promoted to roadmaster at Walton. In December, 1939, Mr. Hann was appointed supervisor of transportation, with headquarters at Middletown, and in October, 1941, he became supervisor of safety.

Carl Djuvik, whose promotion to engineer of bridges and buildings of the Tennessee Central, with headquarters at Nashville, Tenn., was reported in the August issue of *Railway Engineering and Maintenance,* was born at Bergen, Norway, on October 6, 1905, and attended college in that country. Mr. Djuvik came to the United States and continued studies in architecture and design while employed as a carpenter on the Wyoming division of the Chicago & North Western in 1924. Subsequently, he served on this road as a pile-driver engineer, crawler-crane operator and assistant bridge and building foreman. In 1928, he was promoted to bridge and building foreman. During 1936, Mr. Djuvik served as a construction foreman with the United States Reclamation Service and as construction superintendent on a project involving a line change on the Chicago, Burlington & Quincy at Chariton, Iowa. In 1937, he accepted a position with the Tennessee Central as assistant supervisor of bridges and buildings at Nashville, leaving this road in 1938 to serve as an instrumentman in the United States Engineer office. In 1939, he returned to the Tennessee Central as supervisor of buildings in charge of new construction, being appointed supervisor of bridges and buildings in May, 1942, which position he held until his recent promotion, effective July 16.

Donald C. Barrett, who retired on July 1 as division engineer on the Chicago & North Western, with headquarters at Norfolk, Neb., as reported in the July issue, was born at Norway, Iowa, on December 12, 1879, and graduated in civil engineering from Iowa State College in 1905. He entered railway service on July 22, 1897, as a call boy on the North Western at Belle Plaine, Iowa, and then served as roadmaster's clerk and material clerk at that point, storekeeper's clerk at Escanaba, Mich., material clerk at Peoria, Ill., and chief clerk to the division engineer at Chicago. On October 18, 1901, he resigned to enter college. He continued to work for the North Western during vacations from school and after graduation became a draftsman at Boone, Iowa. During the next few years he served as rodman, instrumentman and assistant engineer at various points in South Dakota and at Chicago, and as assistant engineer and cost engineer for the Bureau of Valuation of the Interstate Commerce Commission at Chicago. On April 1, 1920, Mr. Barrett was appointed assistant engineer on the Nebraska division at Norfolk, and on November 25, 1925, he was transferred to the Wisconsin division, with headquarters at Chicago. He was promoted to division engineer, with headquarters at Winona, Minn., on September 1, 1927, and was appointed supervisor of bridges and buildings at Winona on August 15, 1931. Mr. Barrett was advanced to division engineer of the Black Hills division, with headquarters at Chadron, on January 1, 1936, and on November 1, 1939, he was transferred to the Nebraska division, with headquarters at Norfolk, where he remained until his retirement.

Track

D. C. McLeod, relief roadmaster on the Canadian Pacific at Ignace, Ont., has been promoted to roadmaster at Brandon, Man., succeeding **G. W. Coburn,** who has retired.

C. Hogland, general foreman on the Rio Grande division of the Southern Pacific, has been appointed roadmaster at Carrizozo, N.M., succeeding **E. M. Montfort,** transferred to other assignments in the division engineer's office.

H. L. Standbridge, track supervisor on the Chicago, Rock Island & Pacific at Allerton, Iowa, has been promoted to roadmaster at Fairbury, Neb., succeeding **John Christensen,** who has been assigned to other duties.

N. K. Farr, section foreman on the Illinois Central at Centreville, Miss., has been promoted to supervisor of track at Baton Rouge, La., succeeding **K. S. Fale,** who has been granted a leave of absence to engage in military construction work.

Clifford M. Richardson, whose promotion to roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Marceline, Mo., was reported in the July issue, was born at Winchester, Kan., on July 15, 1904, and entered railway service on April 1, 1924, as a section laborer on the Santa Fe at Barclay, Kan. On May 29, 1926, he was promoted to relief section foreman and also worked as an extra gang foreman until February 3, 1930, when he was assigned a regular section at Garnett, Kan. On March 1, 1941, Mr. Richardson was promoted to track supervisor, with headquarters at Ottawa, Kan., which position he held until his recent promotion, effective June 8.

David E. Wisner, whose promotion to roadmaster on the Southern Pacific, with headquarters at Bowie, Ariz., was reported in the July issue, was born at Supply, Okla., on August 23, 1913, and entered railway service on June 17, 1935, as an extra gang laborer and bridge and building helper. In March, 1936, he was pro-

(Continued on page 638)

moted to relief section foreman and a year later he was advanced to extra gang foreman. Mr. Wisner was appointed section foreman in August, 1937, and served in that capacity at Aztec, Ariz., and Bosque, and as extra gang foreman at Benson, Ariz., until October, 1941, when he was advanced to general foreman at Tuscon, Ariz., which position he held until his recent promotion.

J. A. Prybylski, supervisor of track on the New York Central at Dunkirk, N.Y., has been transferred to Sandusky, Ohio, succeeding **E. C. Buhrer,** whose death on July 28 was reported in the August issue, and **William A. Smith,** supervisor of track at Kenton, Ohio, has been transferred to Dunkirk, replacing Mr. Prybylski.

Charles C. Bell, whose promotion to roadmaster on the Southern Pacific, with headquarters at Tucumcari, N. M., was reported in the July issue, was born at Bucklin, Kan., on February 17, 1904, and entered railway service on September 15, 1924, as a section laborer on the El Paso & Southwestern (now part of the Southern Pacific) at Pastura, N. M. He was promoted to student foreman at Duran, N. M., on October 17, 1925, and on June 1, 1928, was advanced to regular section foreman at Guadalupe, N. M. Mr. Bell continued in that capacity, with the exception of about 2½ years as an extra gang foreman, until October 8, 1938, when he was promoted to general track foreman, which position he held until his recent promotion, effective June 1.

John B. Harvey, whose promotion to roadmaster on the Denver & Rio Grande Western, with headquarters at Walsenburg, Colo., was reported in the June issue, was born at Bucyrus, Kan., on October 17, 1905, and graduated in civil engineering from the University of Kansas in 1927. Previous to graduation he worked during vacations on the Missouri Pacific, entering railway service on June 8, 1925, as an extra gang timekeeper, and later serving as assistant extra gang foreman, timekeeper, bridge and building mechanic and bridge and building laborer. Shortly after graduation, he returned to the Missouri Pacific, serving as a rodman for two years and as an instrumentman for one year at various points in Missouri, Arkansas and Nebraska. On March 19, 1934, Mr. Harvey went with the Wilson Engineering Company at Salina, Kan., as an instrumentman, and on March 9, 1936, he went with the D. & R. G. W. as a rodman at Pueblo, Colo. He was promoted to instrumentman at Pueblo a few weeks later, and on October 19, 1936, he was advanced to assistant engineer. Mr. Harvey was transferred to Salt Lake City on November 1, 1941, where he remained until his recent promotion, effective May 19.

John F. Foley, whose promotion to roadmaster on the Chicago, Burlington & Quincy, with headquarters at St. Joseph, Mo., was reported in the July issue, was born at Parkville, Mo., on April 13, 1901, and attended the Park College Academy at Parkville and Central Business College at Kansas City, Mo. He entered railway service on May 27, 1917, as a section laborer on the Burlington at Parkville and on July 27, 1921, was promoted to extra foreman. On September 24, 1924, he was assigned a regular section at Payne, Iowa, and worked as section foreman, extra gang foreman and branch line general foreman at various points in Iowa and Missouri until April 16, 1936, when he was promoted to track supervisor on the Hannibal division. Three months later, Mr. Foley was appointed extra gang foreman, and on April 1, 1937, he was advanced to assistant roadmaster in charge of a system rail laying gang. About six months later, he returned to the St. Joseph division as a section and extra gang foreman, and on December 18, 1939, he was promoted to track supervisor at Craig, Mo. On July 1, 1941, he was advanced to acting roadmaster at Kansas City, Mo., and three months later he was appointed track supervisor at St. Joseph, which position he held until his recent promotion, effective July 1.

William B. Jacobsen, whose promotion to roadmaster on the Denver & Rio Grande Western at Alamosa, Colo., was reported in the July issue, was born at Rhodes, Iowa, on October 22, 1912, and graduated in civil engineering from Iowa State College in 1940. He entered railway service in May, 1930, and served intermittently in the engineering and bridge and building departments of the Chicago & North Western until September, 1937, when he resigned to attend college. In June, 1940, he became a detail draftsman with the Consolidated Aircraft Company at San Diego, Cal., and four months later he went with the D. & R. G. W. as engineering assistant at Grand Junction, Colo. In August, 1941, Mr. Jacobsen was appointed assistant engineer at Salt Lake City, Utah, and in November, 1941, he was appointed track inspector at Ephraim, Utah, which position he held until his recent promotion effective June 15. Mr. Jacobsen holds a commission as a 1st lieutenant in the Military Railway Service.

Obituary

Alvin C. Harvey, chief engineer of the New York, Chicago & St. Louis (Nickel Plate), with headquarters at Cleveland, Ohio, died of a heart attack on August 22, after an illness of two weeks.

George W. Anderson, supervisor of water treatment and fuel service on the St. Louis Southwestern, with headquarters at Mt. Pleasant, Tex., died of a heart attack on August 3 while on a train en route to Pine Bluff, Ark.

John B. Wesley, engineer of water service of the Missouri Pacific, with headquarters at St. Louis, Mo., died suddenly on July 1 following a heart attack. Mr. Wesley was born in Kentucky on June 14, 1886, and taught school in the Philippines from 1911 to 1915. In 1916 he entered the service of the Missouri Pacific as water chemist at Little Rock, Ark., and during World War I, served overseas as a sergeant in the Hospital division, returning to the Missouri Pacific at Little Rock in 1919. A year later he was transferred to Kansas City, Mo., and in 1928 he was promoted to engineer of water service, with headquarters at St. Louis.

Supply Trade News

Personal

Frank M. Boylan has joined the **Buda Company,** of Harvey, Ill., as a field representative in the industrial division, handling railroad products and lifting jacks.

Joseph Michaels, president of the **Hyman-Michaels Company,** Chicago, has been elected chairman of the board and has been succeeded by **Sparrow E. Purdy,** vice-president and general manager. **Everett B. Michaels,** secretary, has been elected executive vice-president.

Robert H. Morse, Jr., branch manager of the Boston, Mass., office of **Fairbanks, Morse & Co.,** has been promoted to assistant sales manager at Chicago and has been succeeded by **John Elmburg,** manager of the Diesel engine department at St. Paul, Minn.

Obituary

T. Aurelius, who retired in 1940 as vice-president and manager of sales of the Railroad division of the Colorado Fuel & Iron Co., Denver, Colo., died in that city on July 31.

Trade Publications

Skilsaw Portable Tools.—A 48-page general catalog, entitled Tools for Defense of America, has been published by Skilsaw, Inc., Chicago. The catalog gives descriptions and specifications of the complete line of portable electric tools manufactured by this company, including saws; drills; belt, disc and floor sanders; bench and hand grinders; and blowers and suction cleaners. The catalog is well illustrated with photographs of the various tools, including construction details and accessories.

Small Electric Motors.—An eight-page folder, F-8623, has been published by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., which describes small electric motors from 1/6 to ½ horsepower, for general use. The standard parts for such motors, making available more than 5000 combinations of type, rating and mounting, are described and illustrated. Charts are presented showing motor characteristics and features conducive to long motor life and low maintenance are discussed, along with the construction details.

Isolated Water Stations—A guide to the selection of electric equipment for isolated water-pumping stations, in the form of a 16-page illustrated booklet, has been issued by the General Electric Company, Schenectady, N. Y. Phases of the subject that are discussed in the booklet include power transmission, requirements and characteristics of the principal items of drive and control equipment required, automatic devices and auxiliary equipment, and the preparation of specifications. Two pages of data useful in designing such installations are given.

A fast moving tamping team

The MT-3 TIE TAMPER

- The lightest known tamper.
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- Will not sliver ties.
- Assures uniformly tamped track.

The CRAWL-AIR COMPRESSOR

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THE CRAWL-AIR is built in 3 sizes to operate 8, 12, or 16 Tie Tampers.

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"An Exhibit During War Time?"

"Boss, are we going to exhibit at the Roadmaster's meeting in Chicago the middle of this month," asked the star salesman.

"I don't know, Bill. I have an application for space on my desk but I haven't given it much thought. Have you any ideas what we should do?" replied the railway sales manager.

"I certainly have, Boss. We always have exhibited and we can't afford to drop out now."

"I'm not so sure you're right, Bill. Conditions are different this year. We're in war now."

"That's the reason why we should exhibit this year, of all years. The railways are making a magnificent contribution to the war effort through the service they're rendering. And we know that *our* equipment is helping them keep their tracks in shape to carry this traffic. It's *our* job to show them how to get the most out of it."

"But we have so little to sell them. We can't fill all the orders we have now."

"That's another reason, Boss, why we've got to exhibit for it'll give us opportunity to show our customers how they can make the equipment they have last until we can get them some more."

"You mean, Bill, that we should participate in this exhibit so we can meet and help our railway friends?"

"That's it, Boss. We can't run out on them now when they need the help we can give them."

"You're right. I'll fill out and mail that application for space to Lew Thomas* today."

"Gee. I'm glad for that, Boss. It'll help us a lot. And I think we ought to step up our advertising in *Railway Engineering and Maintenance* too—to carry the same message of help to the men all over this country who can't get to the convention and who're in just as tight a spot."

"That's true, too. We *do* have a responsibility to our old customers.

"And an opportunity among the new men, too. *Railway Engineering and Maintenance* reaches all of them, old and new."

* Secretary, Track Supply Association, 59 E. Van Buren St., Chicago

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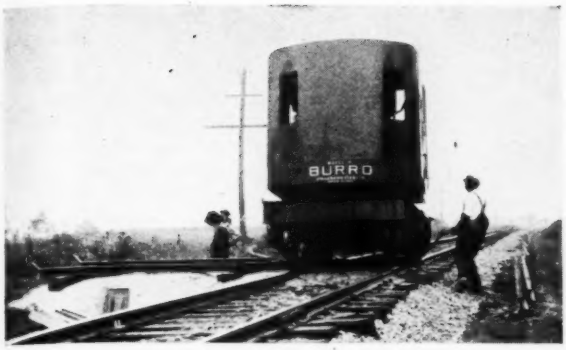

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As usual, Stanley maintains repair service and keeps available replacement parts to serve you promptly during the emergency. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

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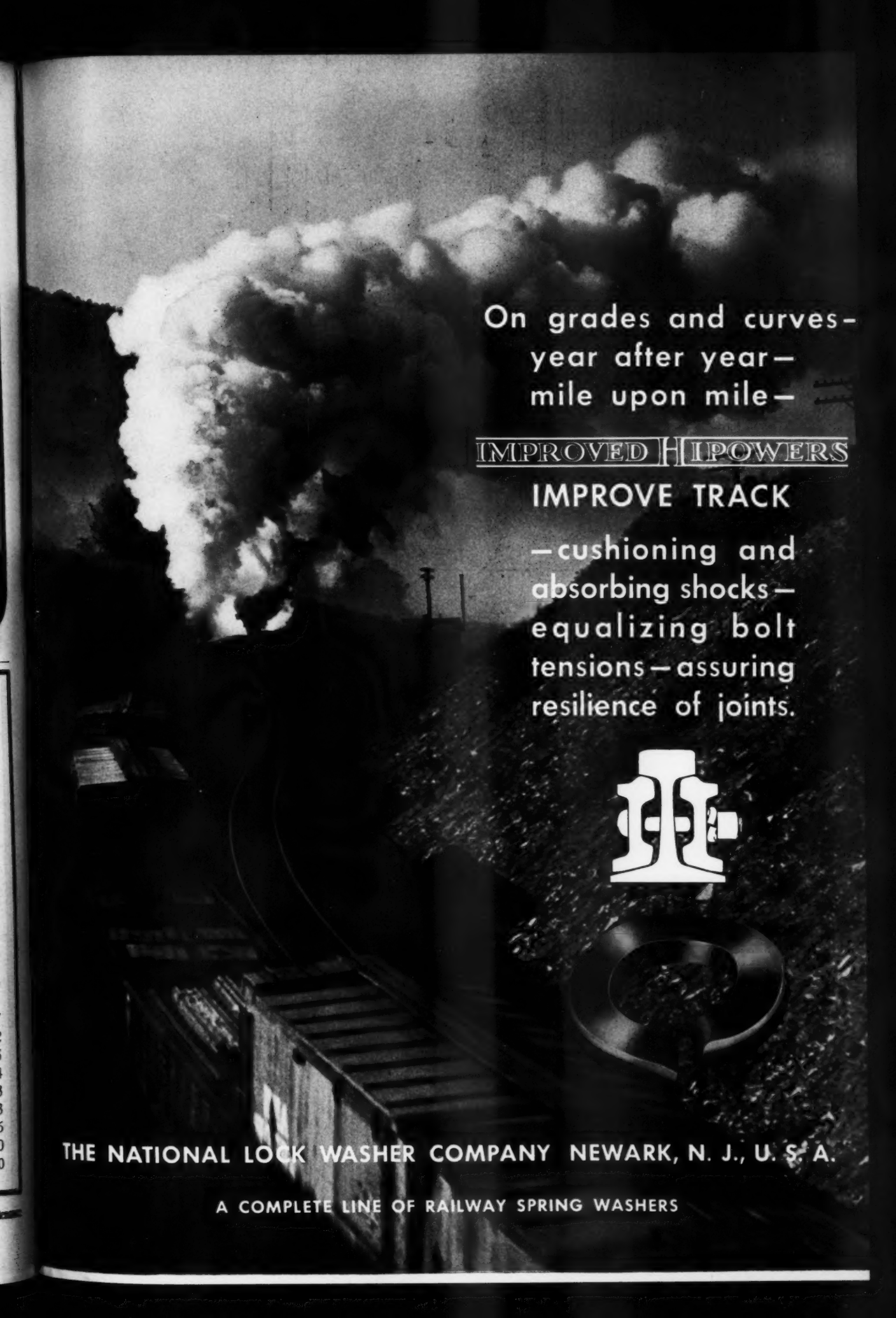
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From coast to coast Worthington's Equipment-Saver is showing Railroad maintenance men how to boost production and lower costs. It points out the best ways to conserve equipment and tools. Write to Holyoke today for your copy of Worthington's EQUIPMENT-SAVER.

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Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

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